EXHIBIT H

TO THE DECLARATION OF ARPITA BHATTACHARYYA IN SUPPORT OF ASETEK DANMARK A/S'S MOTION FOR PARTIAL SUMMARY JUDGMENT

Exhibit D

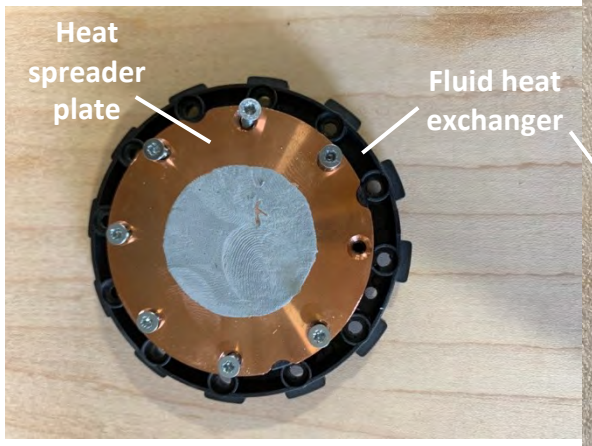
’266 patent

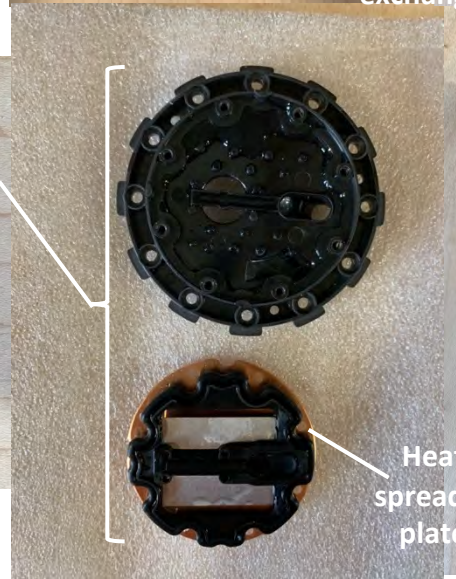
Exhibit D-1

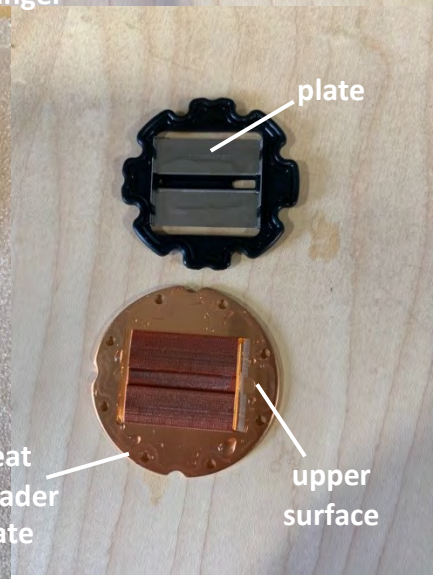
Asetek Gen 4 (represented by a Thermaltake Water 3.0 device - P/N CLW0222-B)

’266 Patent - Claim 13

’266 Patent Claim	Comparison to Thermaltake
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The Thermaltake device includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the Thermaltake device has a copper heat spreader plate and a housing separable from the pump. Thus, the Thermaltake device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component." As shown to the right, the pump is external to the component that transfers heat from a heat source to a cooling liquid. The plastic housing can be sectioned parallel to the copper plate to define a pump external to the component (e.g., below the plane of the section).

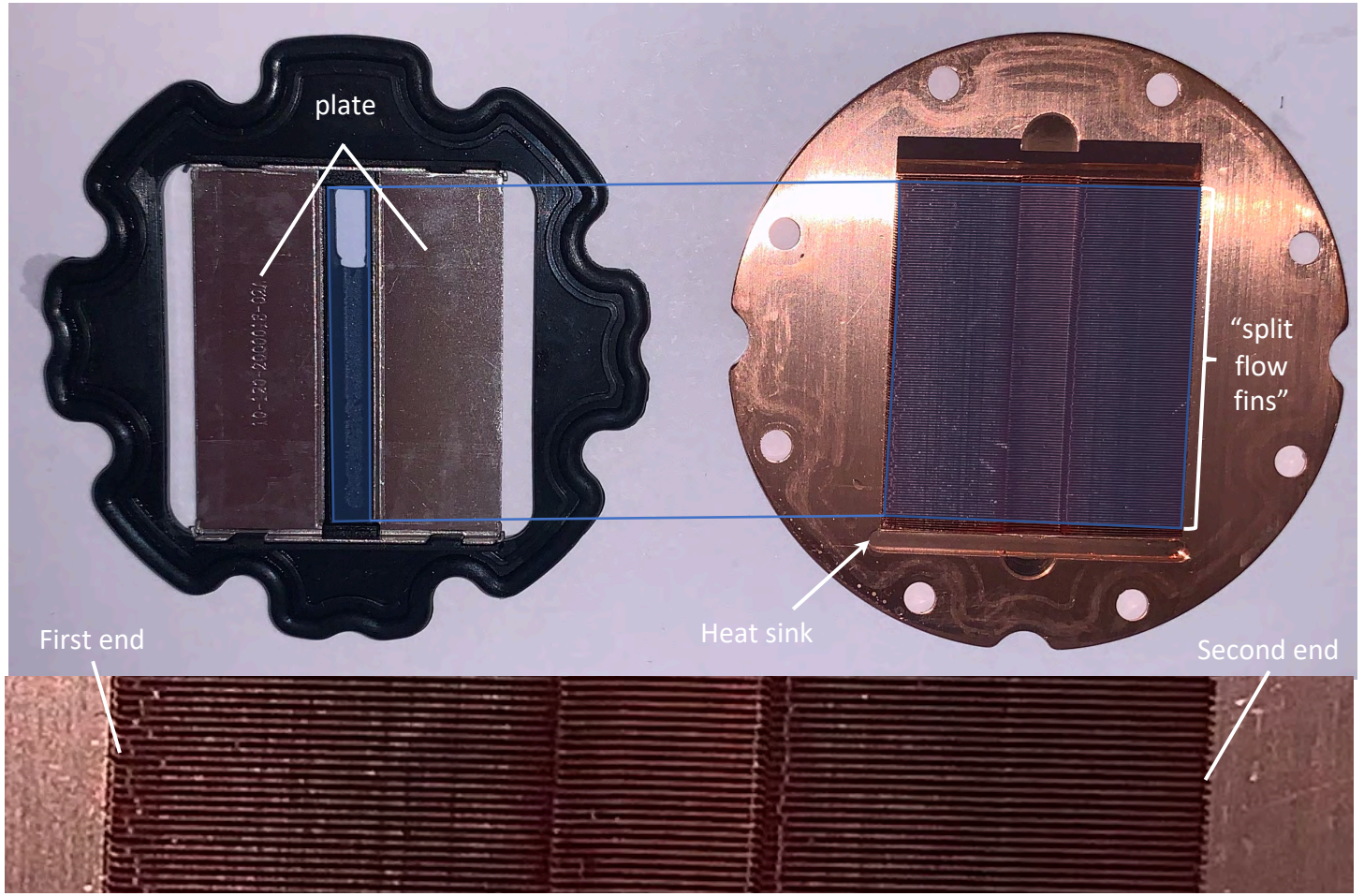






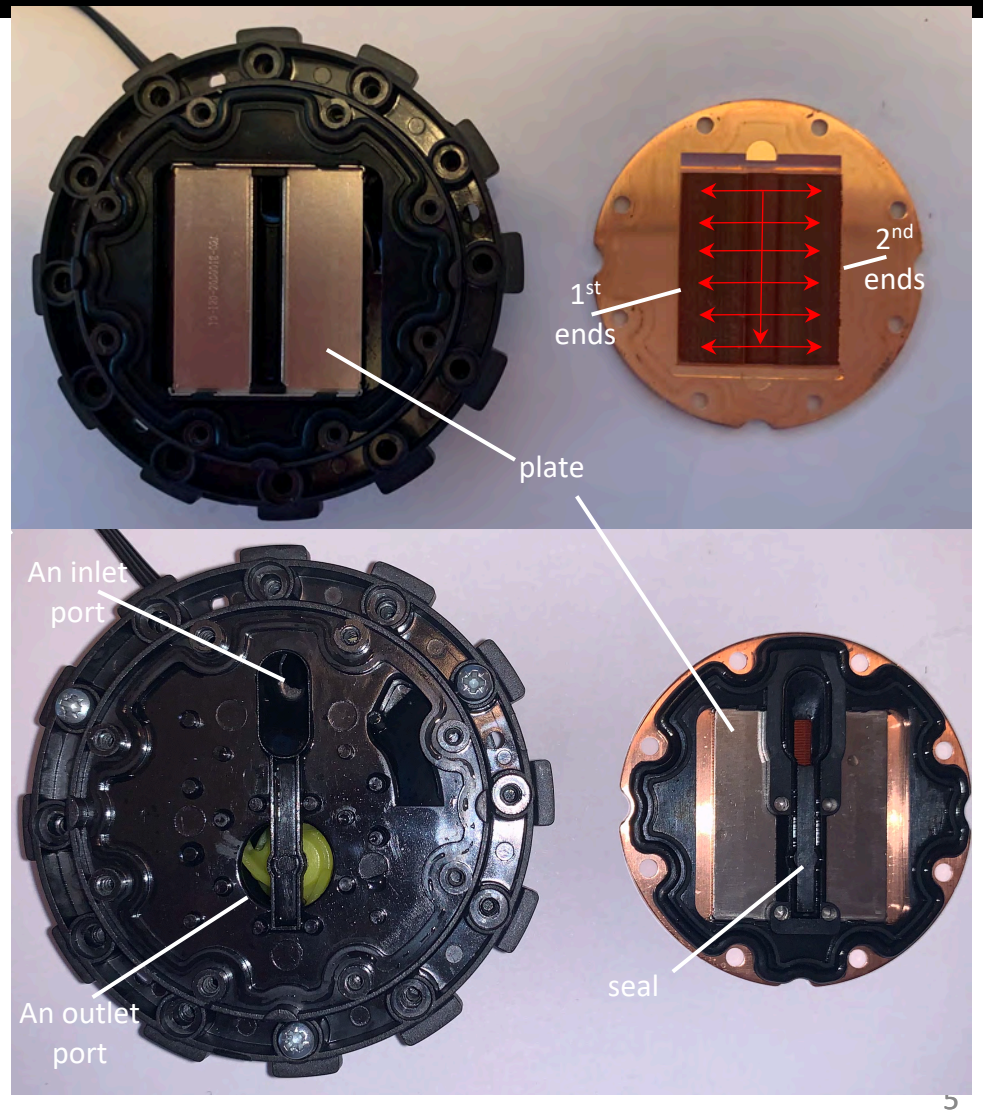
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Thermaltake Device
13[a]. a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;	The Thermaltake device literally includes more than one fin, and this group of fins is spaced apart from each other without any intervening solid structure between them. And, the spacing between the fins define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the Thermal take device satisfies the plurality of walls limitation. For example, the Thermaltake device has several spaced-apart walls (e.g., right, shaded blue). The spacing between each pair of walls defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several walls define a plurality of microchannels that correspond to the walls. As shown to the right, a group of walls and microchannels are positioned beneath the opening (left) in the plate. Each wall in this group is exposed directly to liquid flowing from the opening through the plate. These walls are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “plurality of walls.” As shown in the bottom photograph (detail view of upper right photograph), each microchannel extends from a first end to a second end.



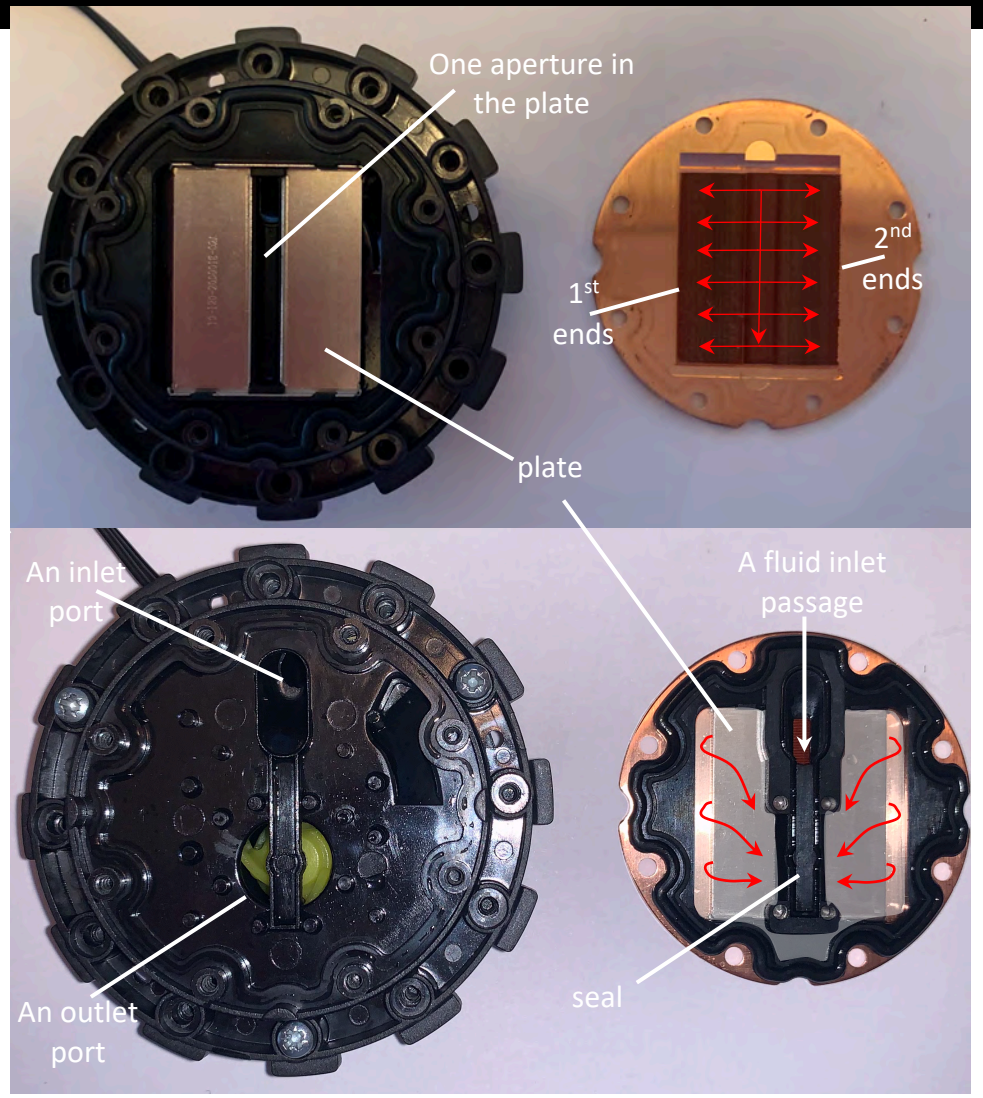
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Thermaltake
13[b]. a plate overlying the walls; and a seal, wherein the seal is a portion of the plate;	The top left and bottom right images show a plate that overlies the plurality of walls, whether the plurality of walls is identified as the “split-flow fins” or another selected group of fins containing more than one fin. The lower right image shows the seal and the upper left image shows the seal as being a portion of the plate. For example, the seal (identified in the lower right image) includes several “tabs” and each of the tabs is press-fit in a notch defined by the plate, allowing the seal to be installed as a portion of the plate, as described in the ’266 patent. See, ’266, col. 12:43-44 (“Seal 230 may be installed as a portion of the plate or separately.”)



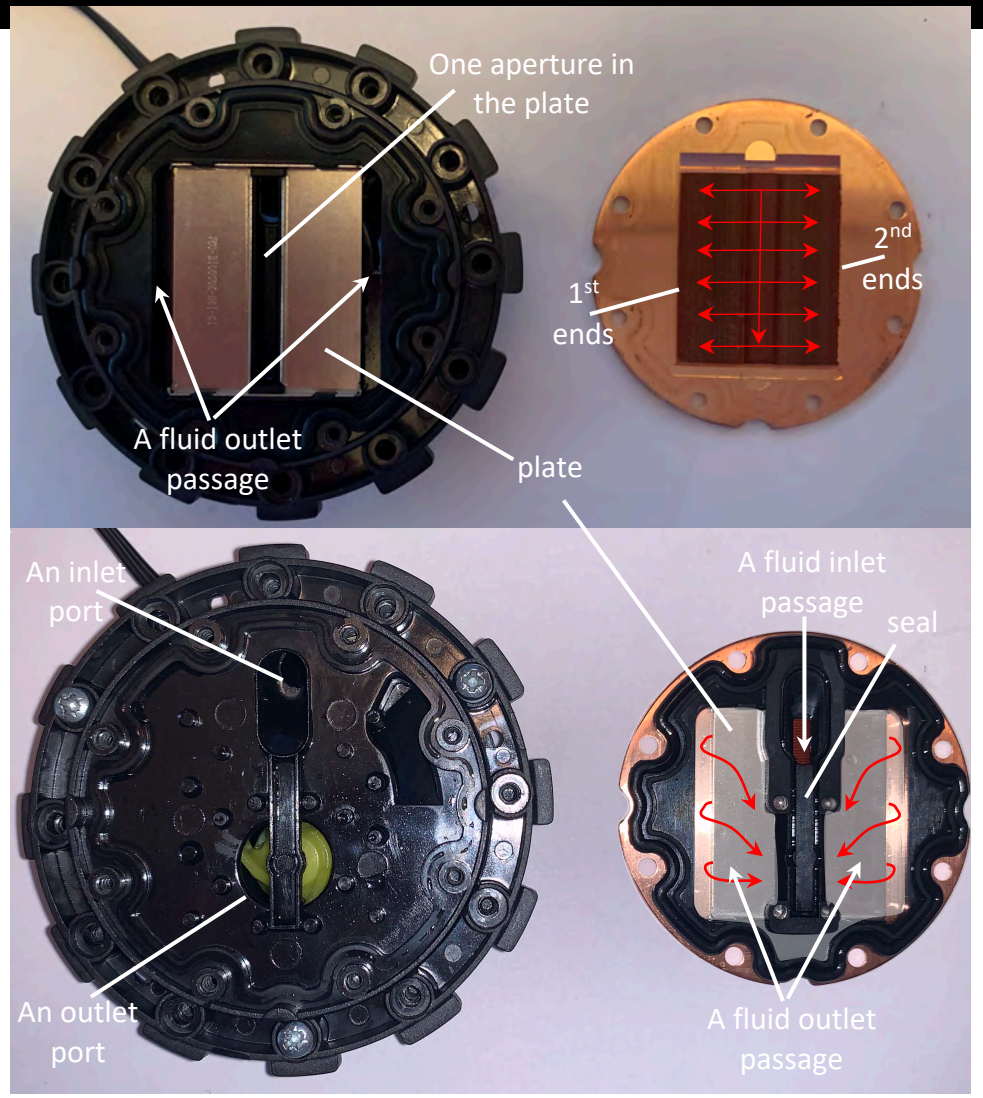
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Thermaltake
13[c]. a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;	The lower right and upper left images show a portion of a fluid inlet passage that delivers coolant through one aperture in the plate to each microchannel (indicated by vertical red arrow in image at upper right). The fluid inlet passage delivers the heat-exchange fluid to each microchannel at a position between the first and second end of each respective microchannel (indicated by vertical red arrow in image at upper right).



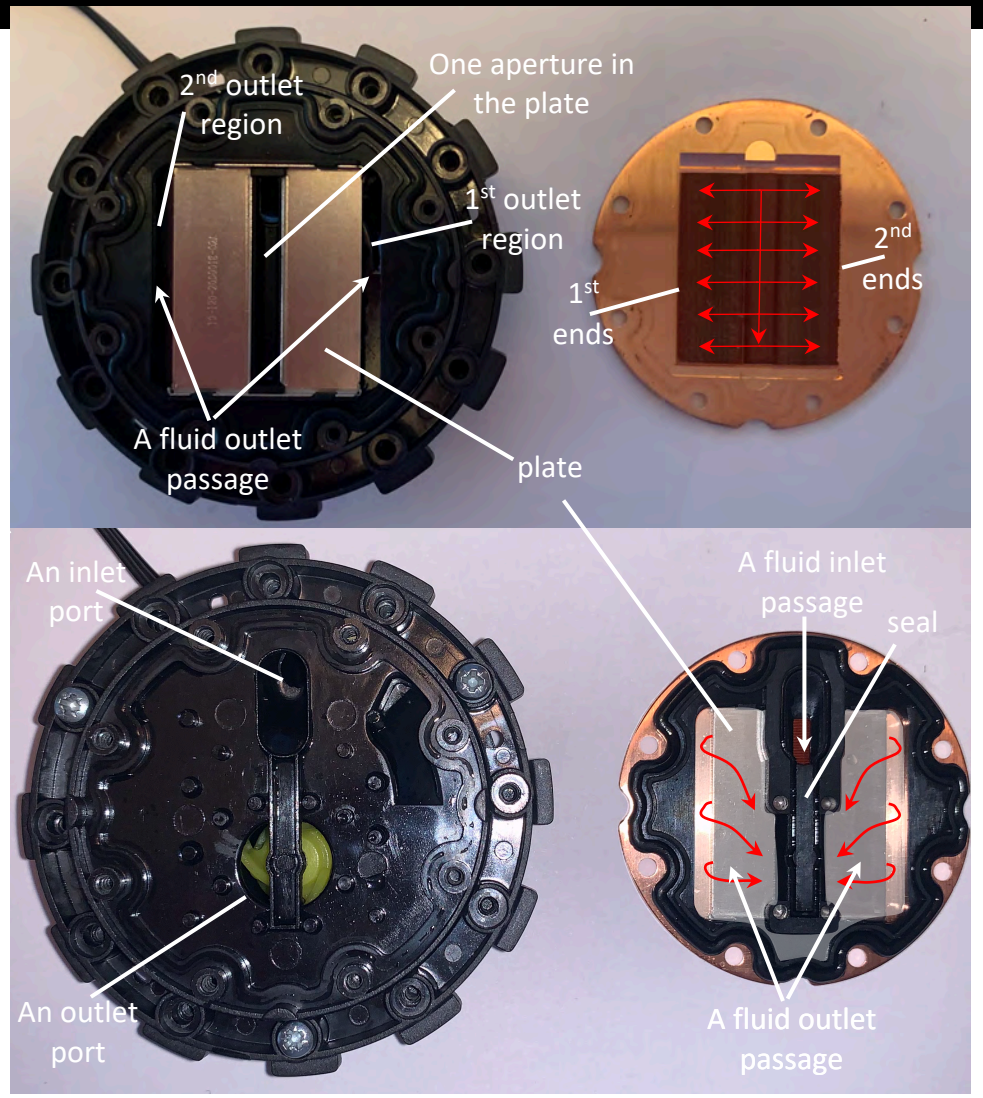
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Thermaltake
13[d]. a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel,	The images at lower right and at upper left show a fluid outlet passage configured to receive the heat exchange fluid from the first end and the second end of each microchannel. As the red arrows in the upper right image indicate, the coolant enters the microchannels and bifurcates into two sub flows: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.



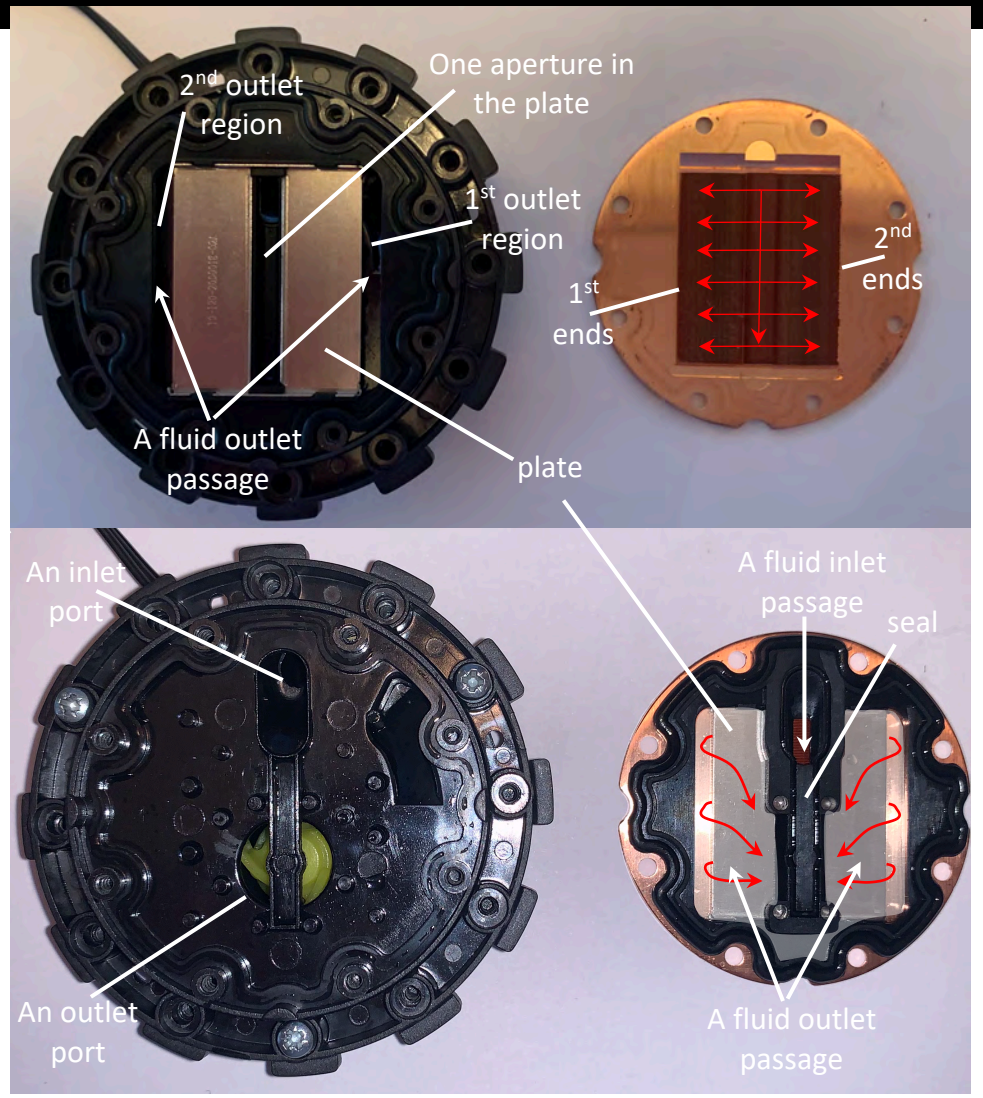
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Thermaltake
13[d][1]. wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends,	The upper left image shows that the fluid outlet passage has a first outlet region positioned with no intervening solid structure between it and the microchannel first ends and a second outlet region positioned with no intervening solid structure between it and the microchannel second ends. The first and second outlet regions also are shown in the image at lower right.



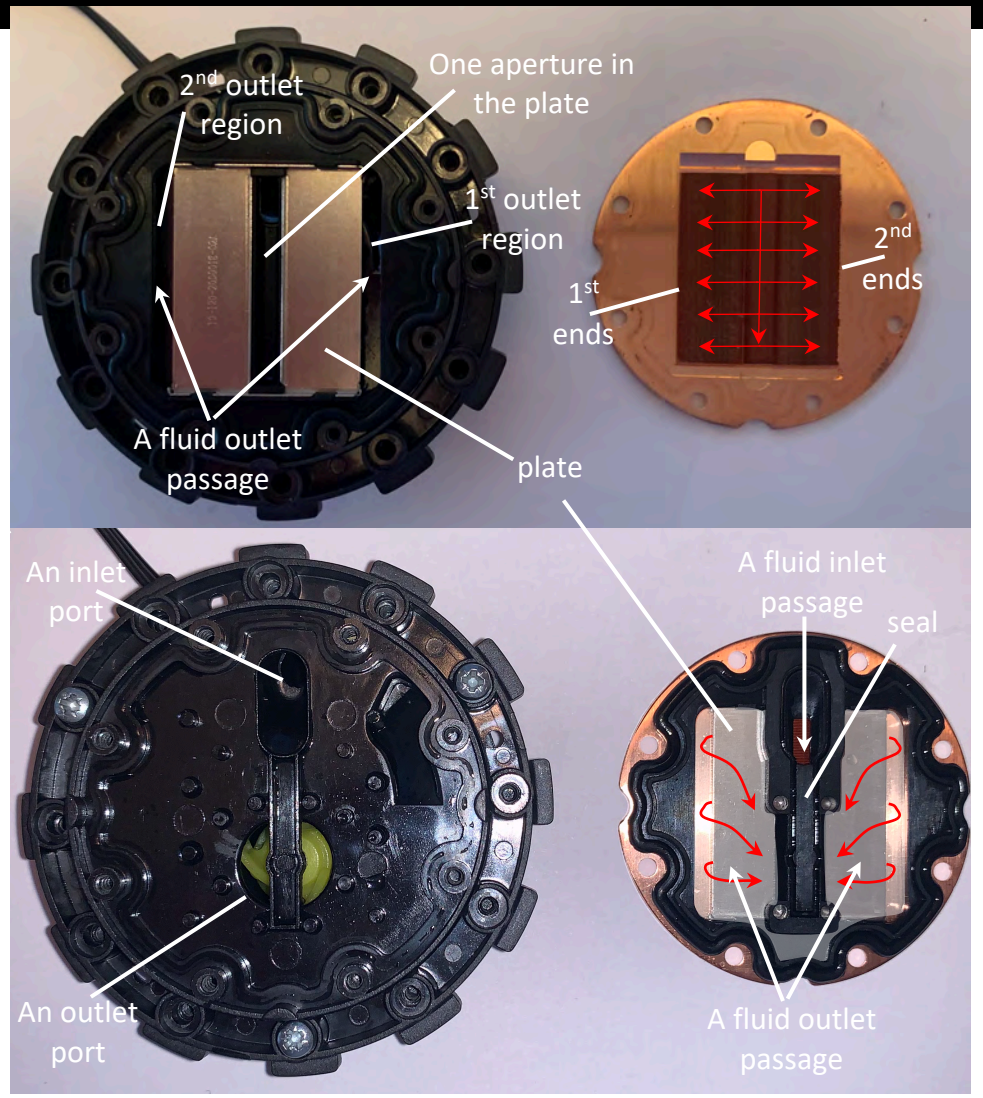
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Thermaltake
13[d][2]. wherein the seal separates the fluid inlet passage from the fluid outlet passage;	The image at lower right shows that the seal separates the inlet passage from the outlet passage. Because of the seal’s position and fluid-tight engagement with the housing and the plate, coolant must flow through the microchannels as indicated by the red arrows (upper right image) before reaching the outlet passage, rather than short circuiting and bypassing the microchannels by flowing directly from the inlet passage to the outlet passage.



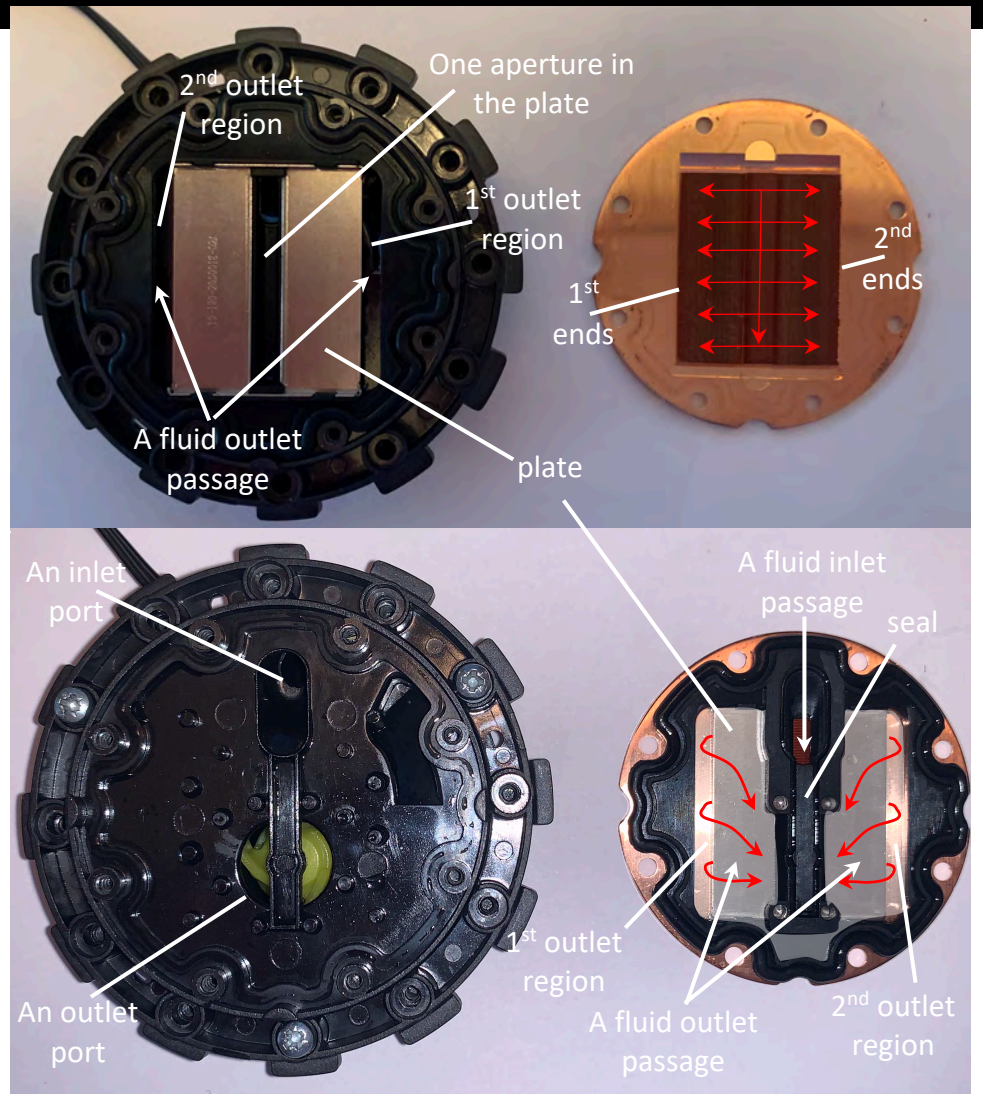
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Thermaltake
13[d][3]. wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel,	As the red arrows in the upper right image indicate, the coolant enters each of the selected ”plurality of microchannels” and bifurcates into two sub flows within each microchannel: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.



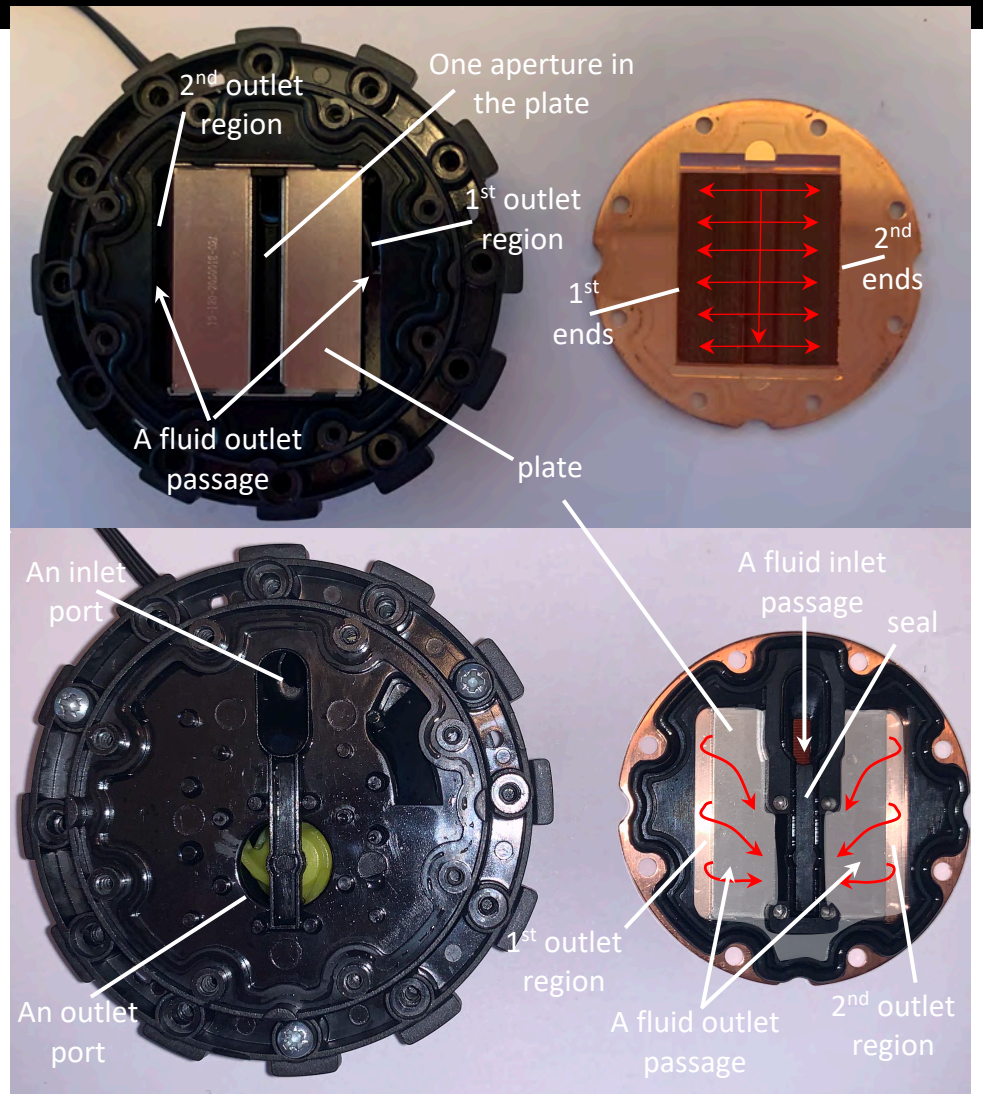
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Thermaltake
13[d][4]. wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends,	As indicated in the lower right image, the first outlet region receives one of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel first ends. Similarly as shown at lower right, the second outlet region receives the other of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel second ends.



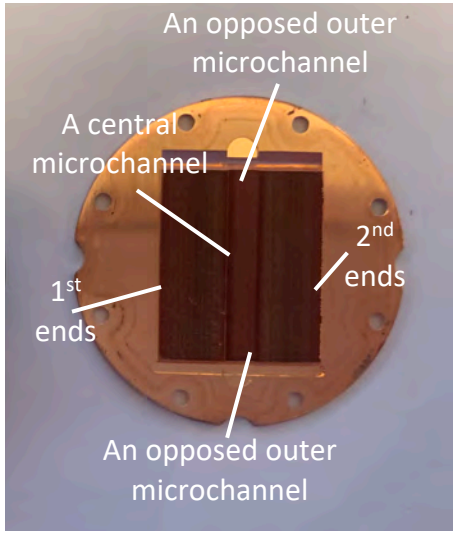
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Thermaltake
13[d][5]. wherein the two sub flows recombine in the outlet passage.	The two sub flows recombine in the outlet passage, e.g., within the shaded white region near the outlet port, similar to a disclosed embodiment in the ’266 patent. See, e.g., ’266 patent, FIG. 2 (showing that each sub flow recombines with the other)



’266 Patent - **Claim 15**

’266 Patent Claim	Comparison to Thermaltake
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	As shown at right, the plurality of microchannels includes at least two outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels. As shown at far right, the first outlet region includes an outlet opening from each microchannel and the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.



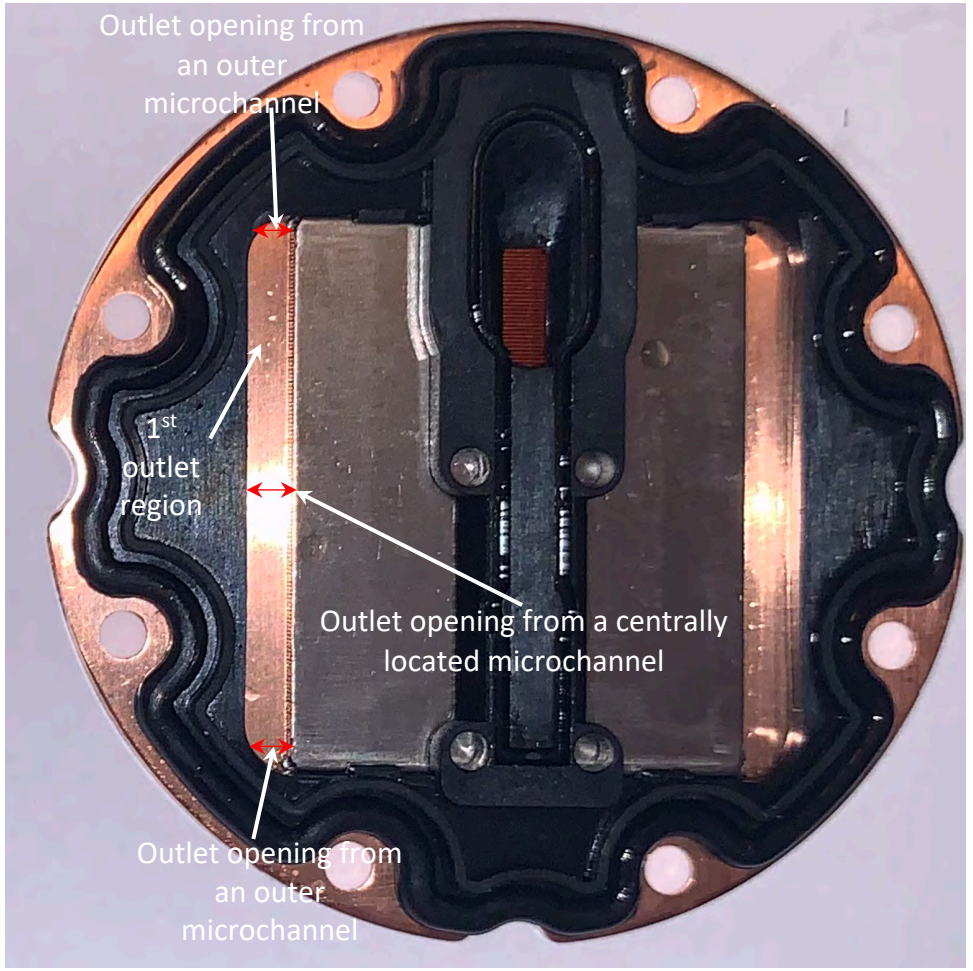
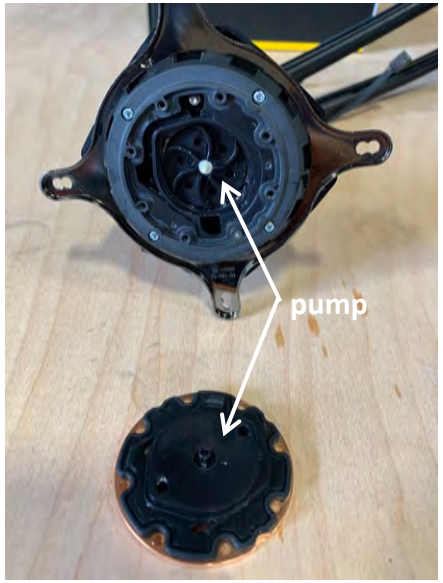


Exhibit D-2

Asetek Gen 5 (represented by a Corsair H80i V2 device)

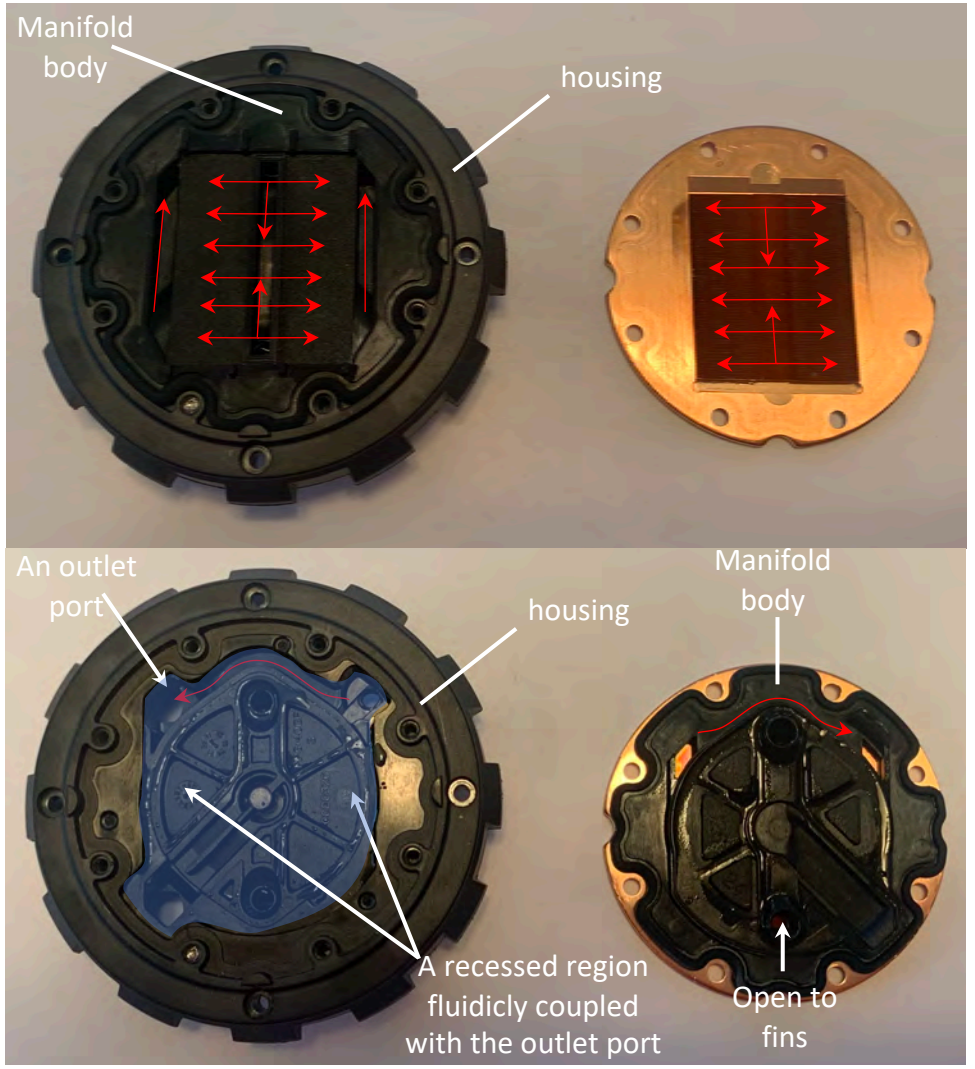
’266 Patent - Claim 1

’266 Patent Claim	Comparison to the H80i V2
1. A heat exchange system comprising:	The H80i V2 device is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



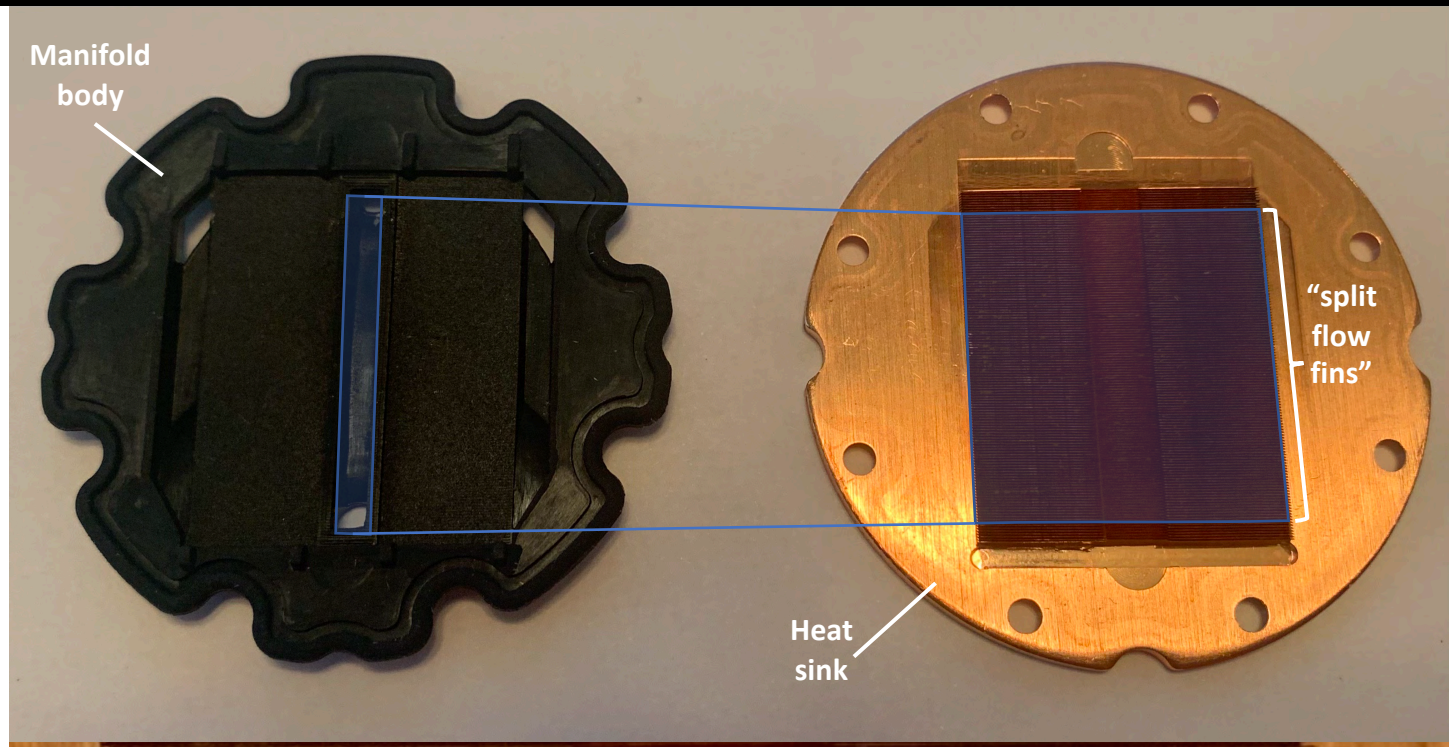
’266 Patent - Claim 1

’266 Patent Claim	Comparison to the H80i V2
1[a]. a housing defining a recessed region and an outlet port fluidicly coupled with the recessed region;	The H80i V2 device defines a recessed region and an outlet port fluidicly coupled with the recessed region. The upper left and lower left images show the housing. At lower left, the outlet port is identified. The recessed region identified by the blue shading sits below and is set back from a major surface having a fluted perimeter. As shown at upper left, a manifold body rests in the identified recessed region, leaving portions of the identified recessed region unoccupied to permit coolant to flow into and through the microchannels (identified by the red arrows at upper left and upper right) before exiting the microchannels and flowing into the outlet port along the paths identified by the upwardly pointing red arrows at upper left and the curved arrow shown at lower left. Thus, the recessed region identified by the blue shading is fluidicly coupled with the outlet port. As well, the housing defines other recessed regions as identified at lower left that are set back from the major surface having the fluted perimeter and that remain unoccupied by the manifold body. As indicated by the red arrows, fluid passes through each identified recessed region as it flows through the cold-plate module toward and ultimately through the outlet port.



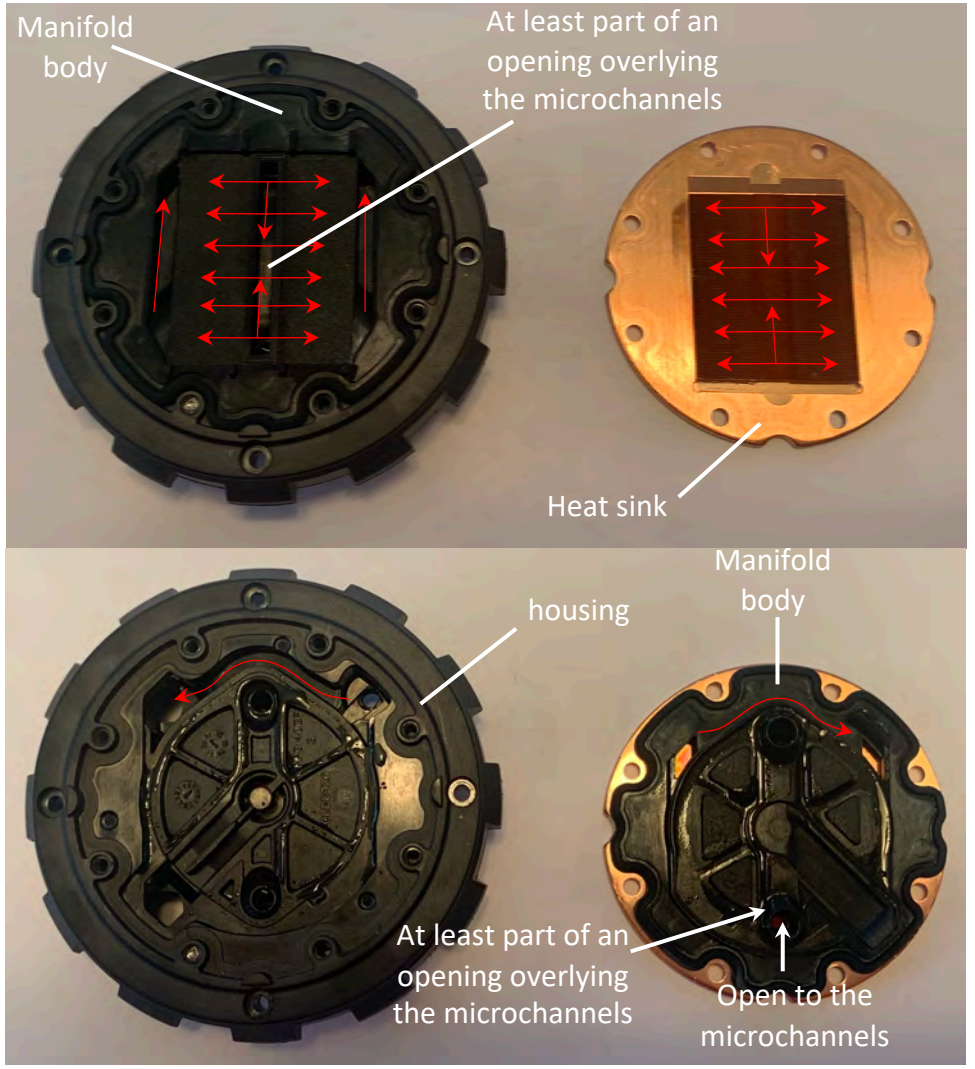
’266 Patent - Claim 1

’266 Patent Claim	Comparison to the H80i V2
1[b]. a heat sink having a plurality of juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins;	The heat sink of the H80i V2 device literally includes more than one fin, and this group of fins is spaced apart from each other without any intervening solid structure between them. And, the spacing between the fins define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the H80i V2 satisfies the plurality of juxtaposed fins limitation. For example, the H80i V2 device has a heat sink with a plurality of juxtaposed fins (e.g., each fin in the plurality of fins has no intervening solid structure between it and the next fin; right, shaded blue). The spacing between each pair of fins defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several spaced apart fins define a plurality of microchannels that correspond to the plurality of juxtaposed fins. As shown to the right, a group of juxtaposed fins and the corresponding plurality of microchannels are positioned beneath the opening (left, blue rectangle) in the manifold body. Each fin in this group is exposed directly to liquid flowing from the opening through the plate. These fins are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins.”



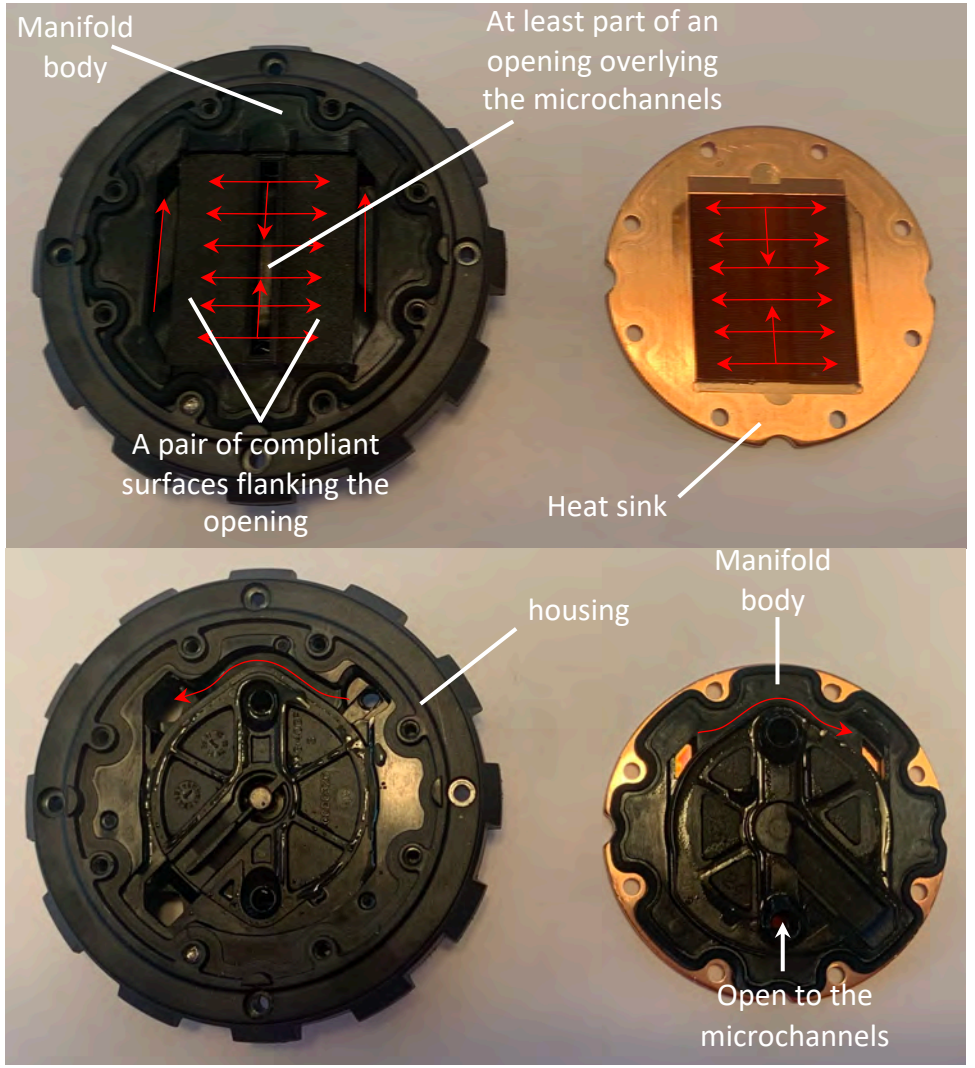
’266 Patent - Claim 1

’266 Patent Claim	Comparison to the H80i V2
1[c]. a manifold body at least partially defining an opening overlying the microchannels,	As shown at upper left, the H80i V2 device includes a manifold body. As shown at lower right, the manifold body overlies the microchannels, regardless of which definition of “plurality of fins” is used. As shown at upper left, the manifold body defines at least part of an opening positioned over the microchannels. This is shown at lower right (note that the fins defining the microchannels are visible through the manifold body).



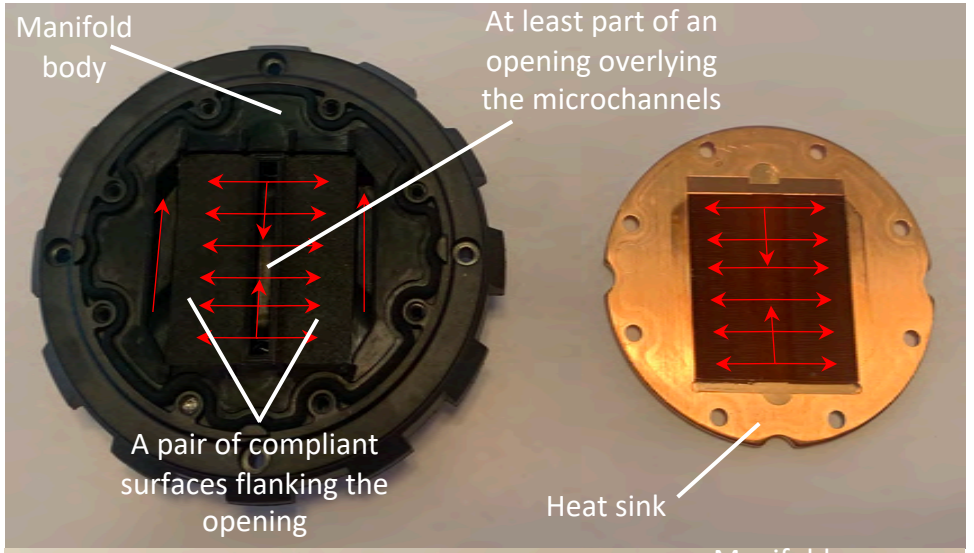
’266 Patent - Claim 1

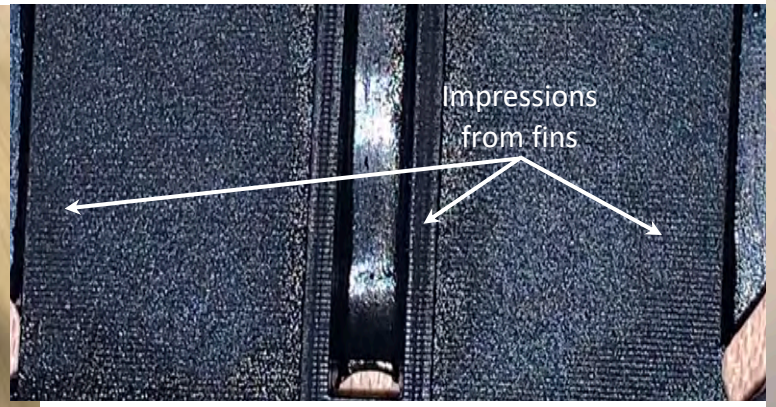
’266 Patent Claim	Comparison to the H80i V2
1[d]. wherein the manifold body defines a pair of compliant surfaces flanking the opening,	At upper left, the H80i V2 device’s pair of compliant surfaces made of a compliant polymer (e.g., rubber) are shown flanking the opening.

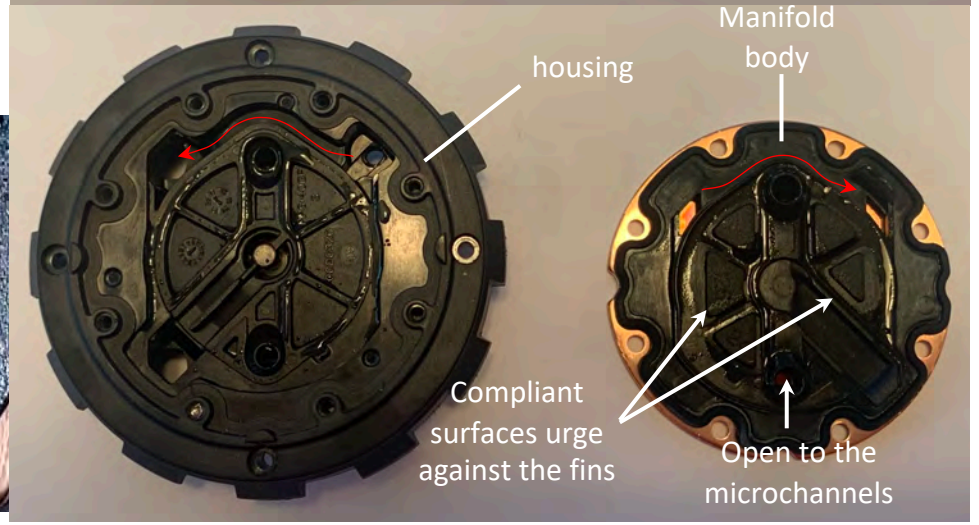


’266 Patent - Claim 1

’266 Patent Claim	Comparison to the H80i V2
1[e]. wherein the compliant surfaces urge against the fins, defining a flow boundary of the microchannels,	When assembled as shown immediately below (left), the H80i V2’s cold-plate module compresses the manifold body (top left and lower right) between the heat sink and the housing, which urges the compliant surfaces against the fins and defines a flow boundary of the microchannels. As shown below (right), on disassembly the compliant surfaces have impressions (e.g., horizontal lines / depressions) arising from being compressed between the housing and the top edges of the fins.

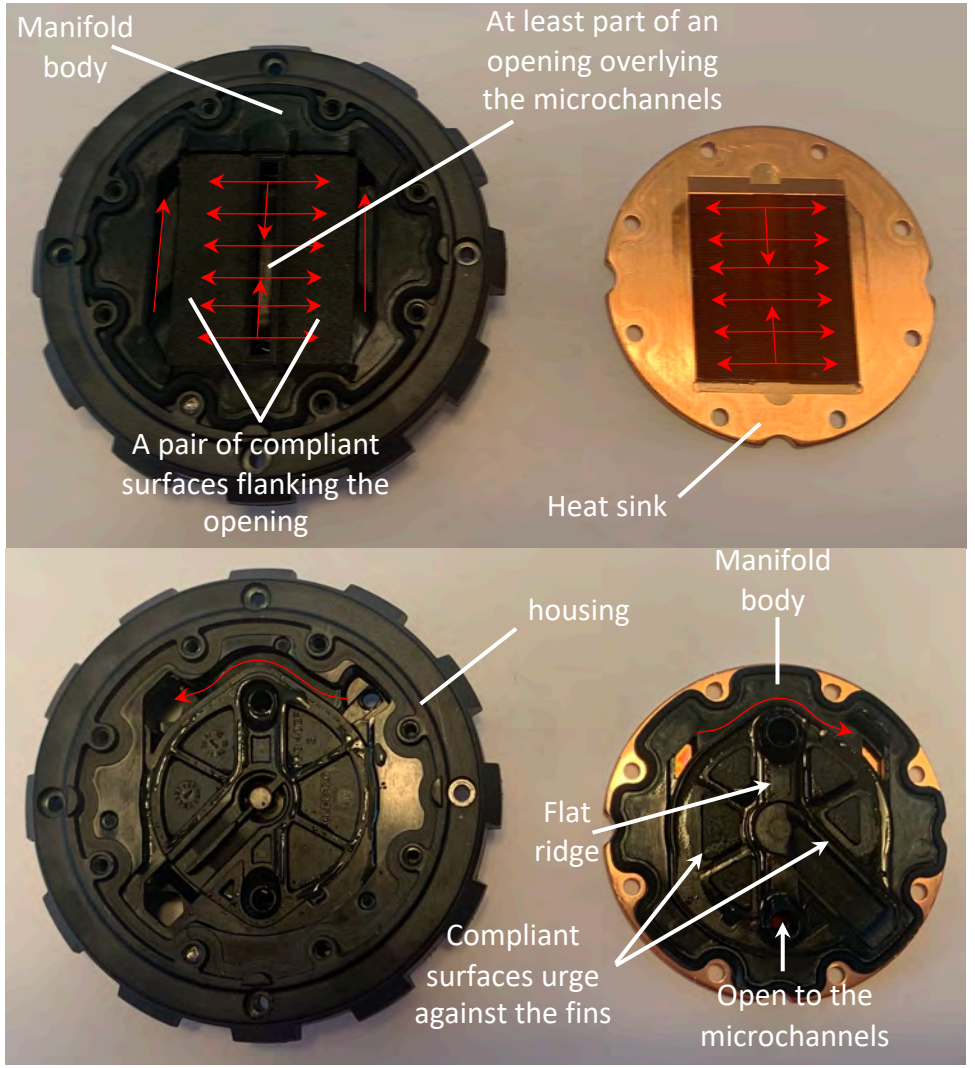






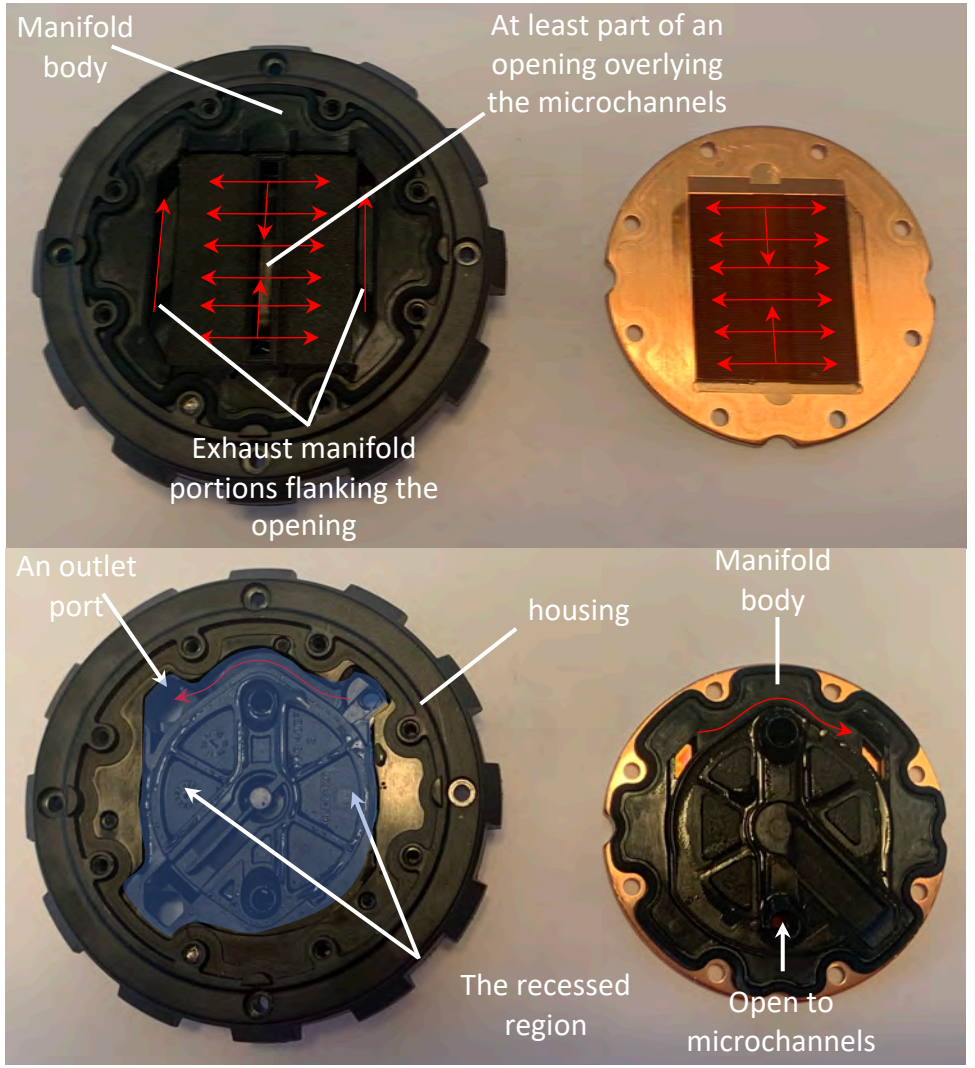
’266 Patent - Claim 1

’266 Patent Claim	Comparison to the H80i V2
1[f]. wherein the opening extends transversely relative to the fins and is configured to distribute a working fluid among the microchannels,	As the upper left image shows, the opening extends transversely (e.g., across the tops of) the fins. The upwardly directed red arrow (center) shown at upper left lies within the opening (e.g., as a longitudinal axis of the opening) and is superimposed over the fins in the upper right image to indicate a flow of a working fluid being distributed among the microchannels. Further, the fins in the image at lower right are oriented as shown in the image at the upper right (note fins are visible below center in the lower right image). The lower right image clearly shows that the longitudinal axis of the opening extends transversely to the fins. Still further, the flat ridge shown in the lower right image corresponds to a portion of the opening that overlies the fins, further demonstrating that the opening extends transversely overtop the fins, which distributes a working fluid among the microchannels as the fluid passes through the opening into the microchannels during operation.



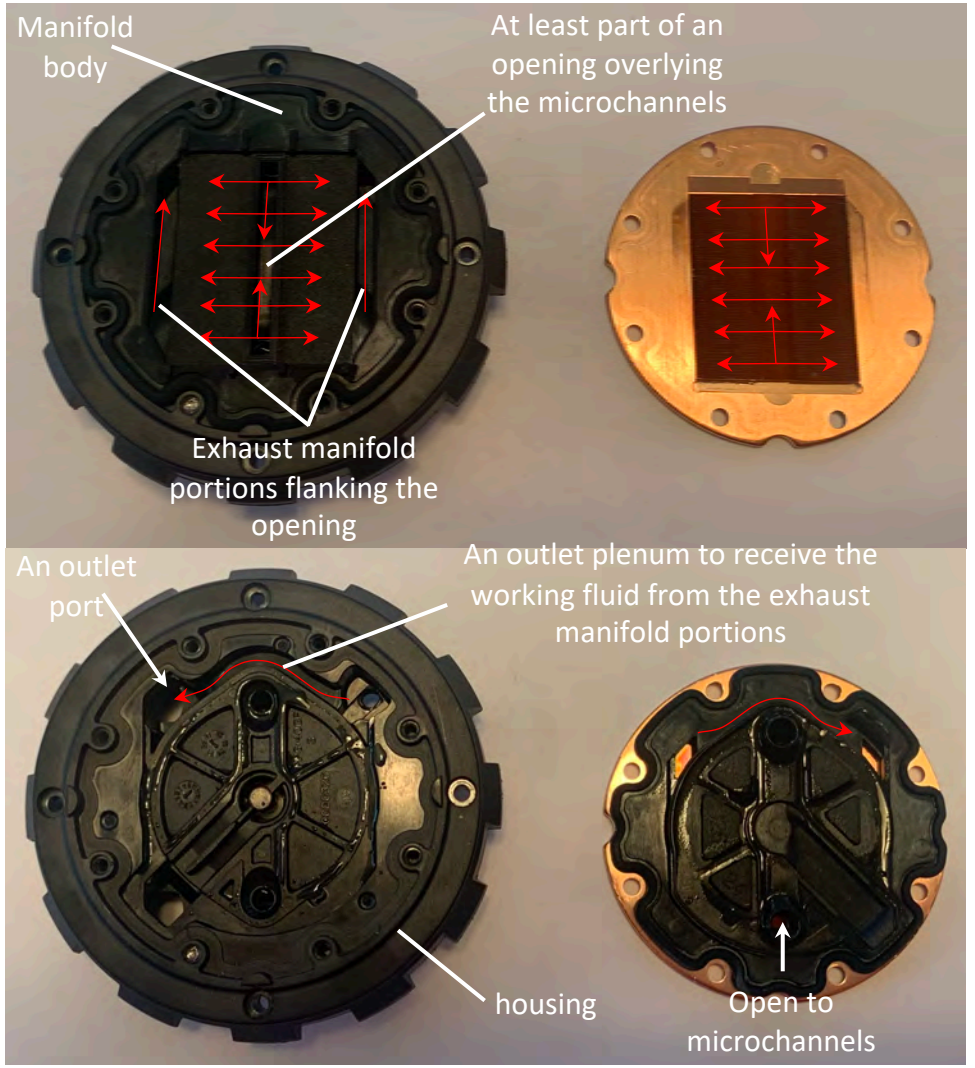
’266 Patent - Claim 1

’266 Patent Claim	Comparison to the H80i V2
1[g]. wherein the manifold body partially occupies the recessed region of the housing, leaving a pair of opposed portions of the recessed region unfilled, defining opposed exhaust manifold portions flanking the opening and being configured to receive the working fluid from the microchannels, and	The upper left image shows the manifold body positioned within and thus partially occupying the recessed region of the housing (e.g., shown at lower left), regardless of which recessed region defined by the housing is selected. In leaving a pair of opposed portions of the selected recessed region unfilled, the manifold body defines opposed exhaust manifold portions flanking the opening, as shown at upper left. The outwardly directed red arrows shown at upper right indicate a flow of the working fluid through the microchannels. The outwardly directed red arrows are superimposed on the image at upper right, showing that the outwardly directed flows of the working fluid through the microchannels enter the opposed exhaust manifold portions. Thus, the opposed exhaust manifold portions flanking the opening are configured to receive the working fluid from the microchannels, as claimed.



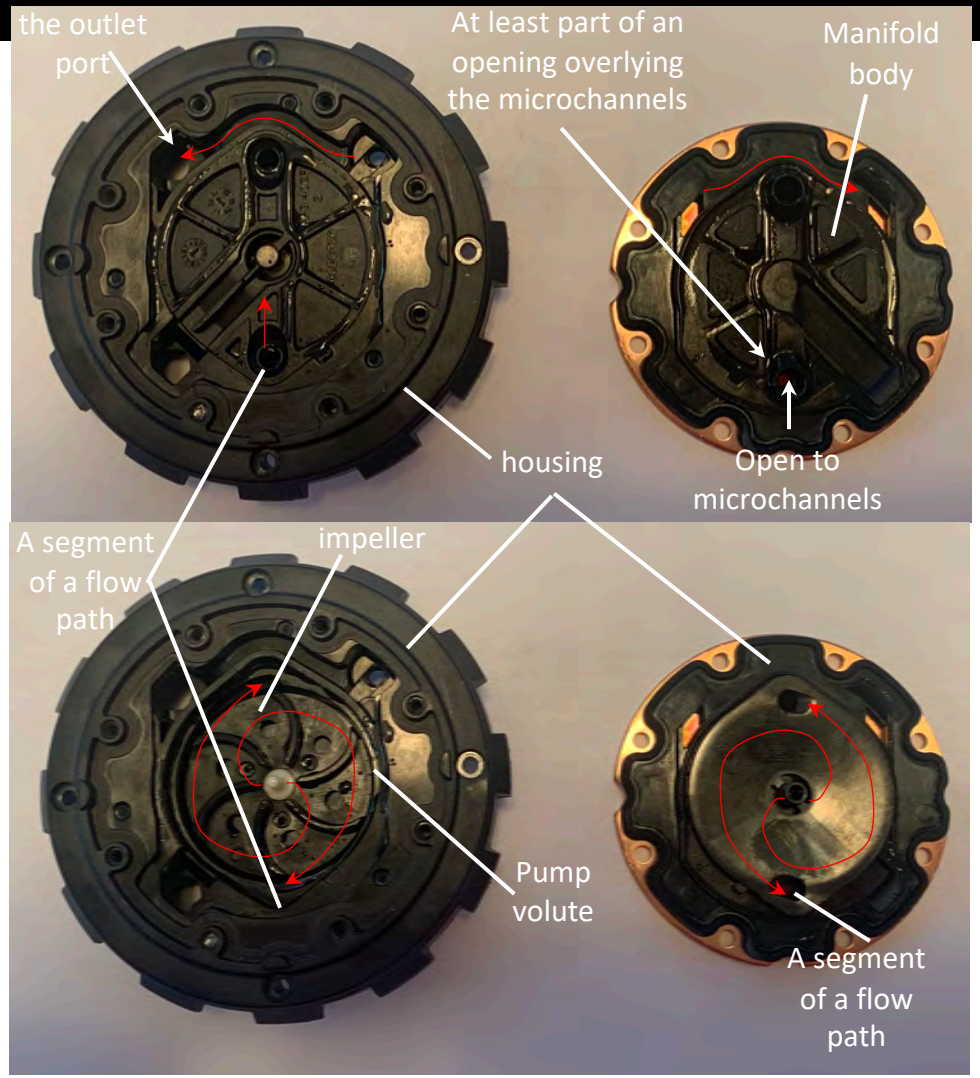
’266 Patent - Claim 1

’266 Patent Claim	Comparison to the H80i V2
1[h]. wherein the housing further defines an outlet plenum configured to receive the working fluid from the exhaust manifold portions and to convey the working fluid to the outlet port.	The image at lower left shows an outlet plenum that receives the working fluid from the exhaust manifold portions. The outlet plenum conveys the working fluid to the outlet port.



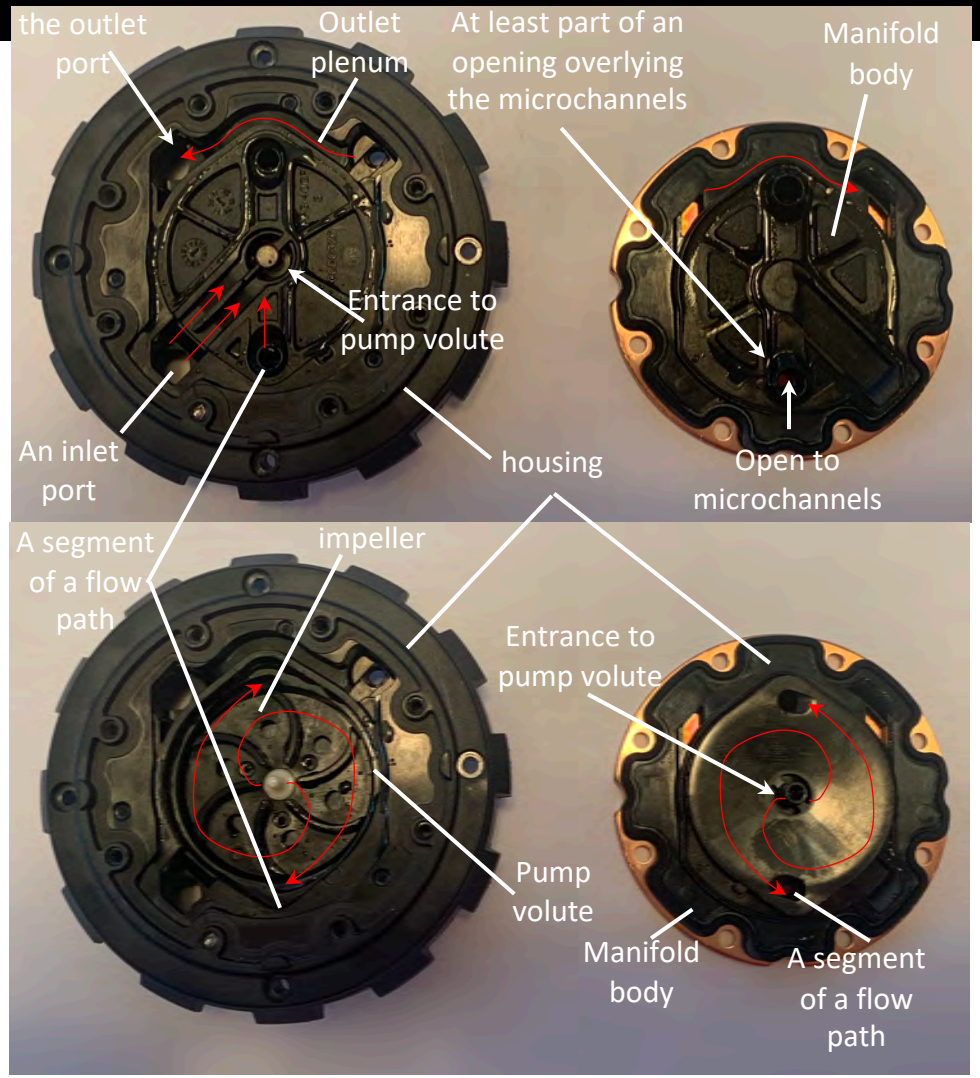
’266 Patent - Claim 2

’266 Patent Claim	Comparison to the H80i V2
2. The heat exchange system according to claim 1, wherein the housing defines a pump volute and a segment of a flow path, the segment configured to convey the working fluid from the pump volute to the opening at least partially defined by the manifold body, the heat exchange system further comprising an impeller positioned in the pump volute and configured to urge the working fluid along the flow path.	The upper left image shows the housing. In the lower left image, a piece of the housing has been removed. (The lower right image shows the removed piece.) The lower left image shows the pump volute defined by the housing. As well, the housing defines a segment of a flow path configured to convey the working fluid from the pump volute to the opening defined in part by the manifold body. For example, the outwardly spiraling red arrows (lower left, lower right) indicate a swirling flow of the working fluid as it passes through and out of the pump volute along the segment. The vertical red arrow in the upper left image depicts a flow of the working fluid out of the pump volute along the flow path segment that passes into the opening (shown at upper right) overlying the microchannels.



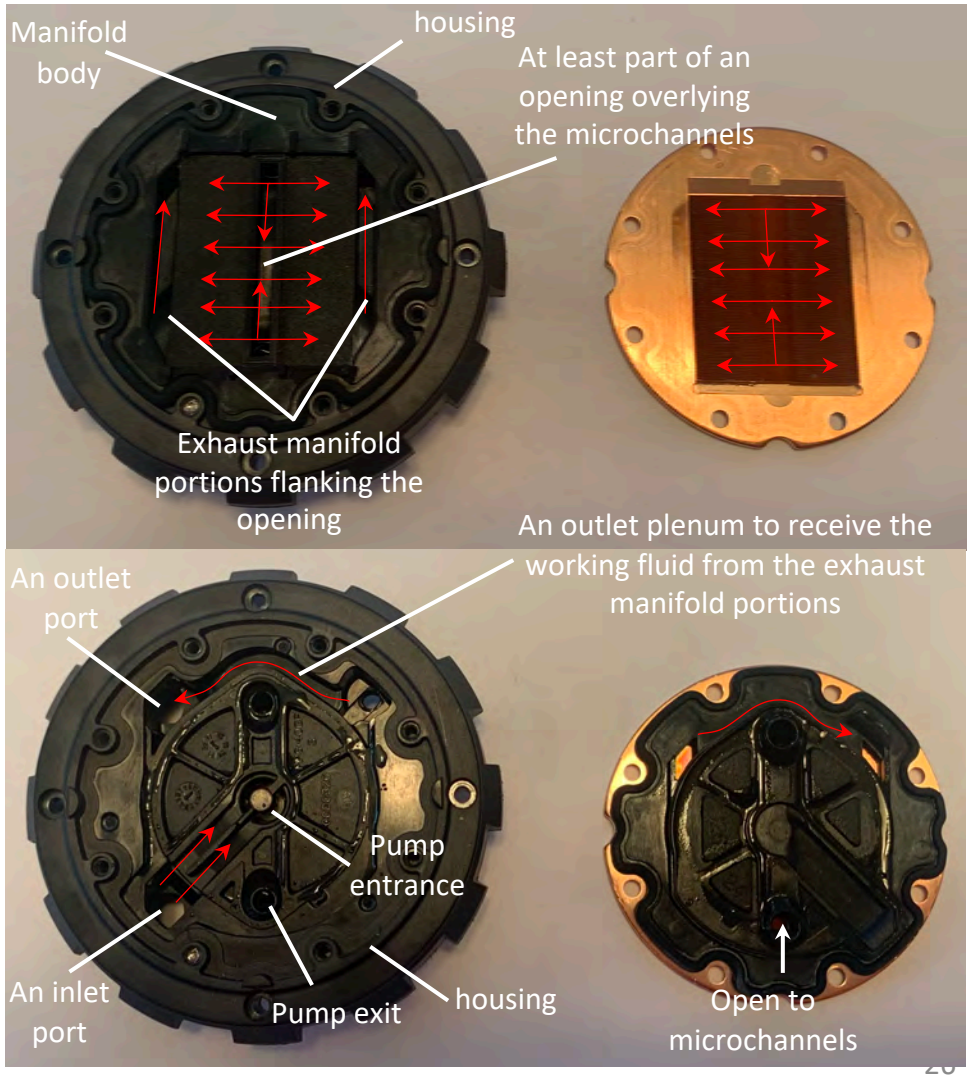
’266 Patent - Claim 5

’266 Patent Claim	Comparison to the H80i V2
5. The heat exchange system according to claim 2, wherein the housing defines an inlet port, wherein the flow path extends from the inlet port to the outlet port and is configured to convey the working fluid from the inlet port through the pump volute, the manifold body, the microchannels, the opposed exhaust manifold portions, and the outlet plenum to the outlet port.	The upper left image shows an inlet port and the outlet port. The red arrows indicate the path that the working fluid follows through the cold-plate module of the H80i V2 device. As indicated at upper left, the fluid enters from the inlet port and flows through a channel into an entrance to the pump volute (also see lower right). On entering the pump volute (lower left; lower right), the spinning impeller (lower left) imparts momentum to the working fluid, which exits the pump volute along the indicated segment of the flow path (spiraling red arrow at lower left; vertical red arrow at lower center of upper left image), passing through the manifold body (upper right image) and entering the microchannels (upper right image). The opposed exhaust manifold portions (not shown on this slide, shown previously; flow path indicated by straight red arrows) collect the working fluid from the microchannels and the working fluid follows the flow path into the outlet plenum (curved red arrow in upper left image), which conveys the working fluid to the outlet port (upper left).



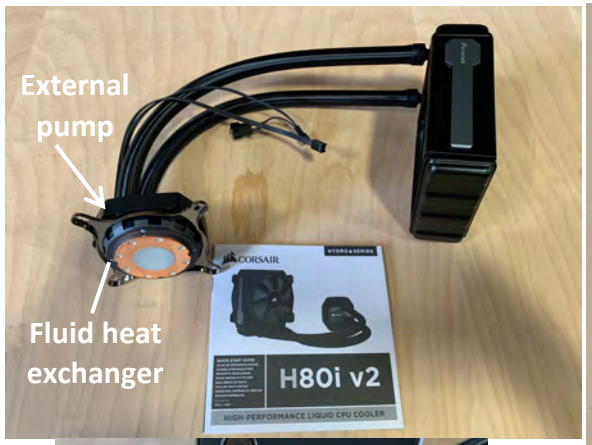
’266 Patent - Claim 9

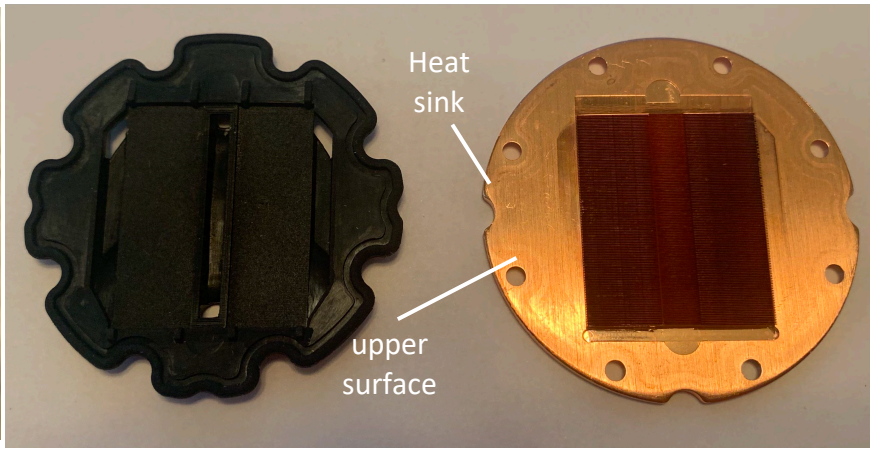
’266 Patent Claim	Comparison to the H80i V2
9. The heat-exchange module according to claim 1, wherein a flow of the working fluid defines a flow path, wherein the flow path is distributed among the plurality of microchannels, and, within each microchannel, the flow path bifurcates into a pair of opposed sub-flow paths directed away from each other.	Coolant flow through the H80i V2 device defines a flow path. Red arrows superimposed on the images at right indicate the flow path. After exiting the pump (below center of lower left image), the coolant passes into the opening overlying the microchannels (indicated by central, upwardly directed red arrow at upper left). As the coolant flows over top the microchannels, the coolant flow (and thus the path the flow defines) is distributed among the plurality of microchannels, as indicated by the upwardly directed red arrow superimposed on the upper right image. The coolant flow enters each of the microchannels and, within each microchannel, splits (or bifurcates) into outwardly directed sub-flows (indicated by the outwardly directed red arrows superimposed on the upper right image). Thus, the coolant flow defines a flow path that bifurcates within each microchannel into a pair of opposed sub-flow paths directed away from each other, as claim 9 recites.



’266 Patent - Claim 13

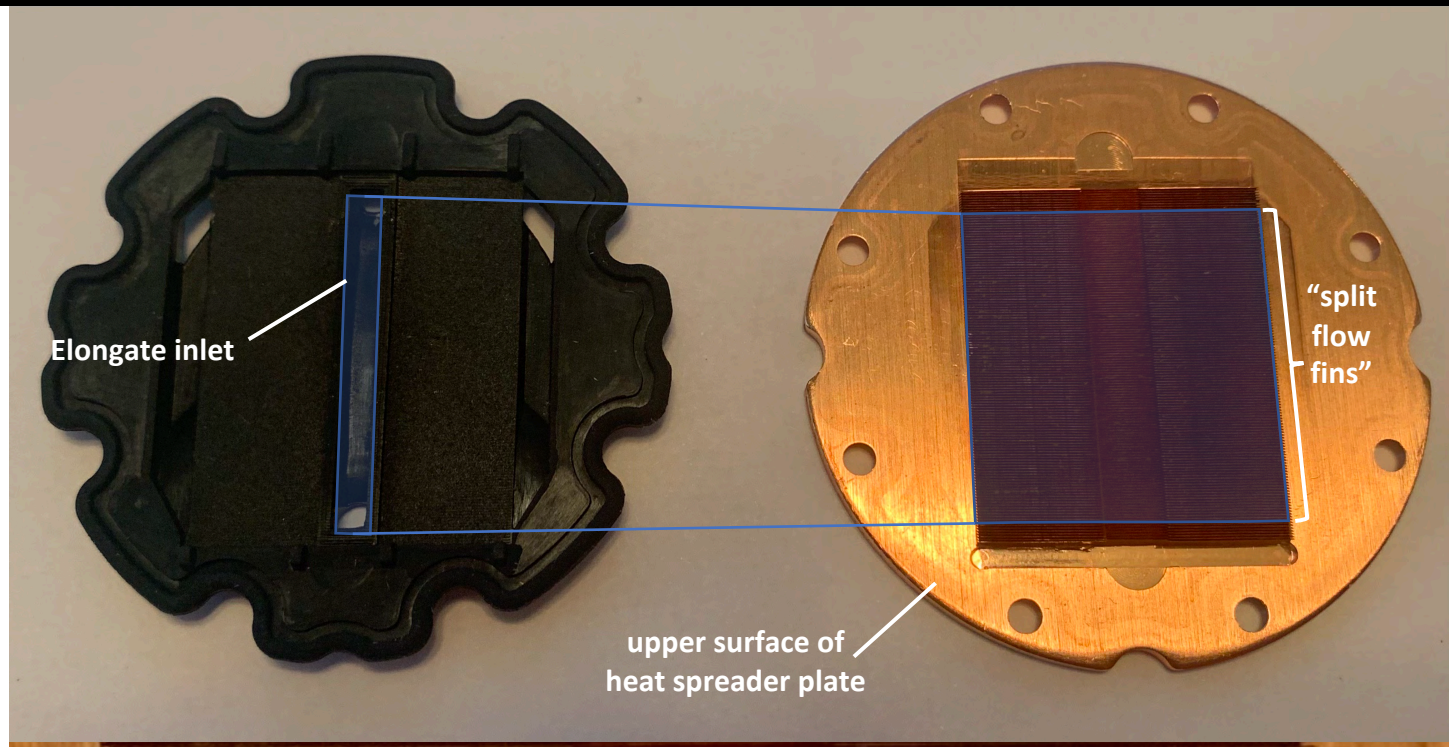
’266 Patent Claim	Comparison to the H80i V2
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The H80i V2 device includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the H80i V2 device has a copper heat sink and a housing separable from the pump. Thus, the H80i V2 includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component." As shown to the right, the pump is external to the component that transfers heat from a heat source to a cooling liquid. The plastic housing can be sectioned parallel to the heat sink base to define a pump external to the component (e.g., below the plane of the section).





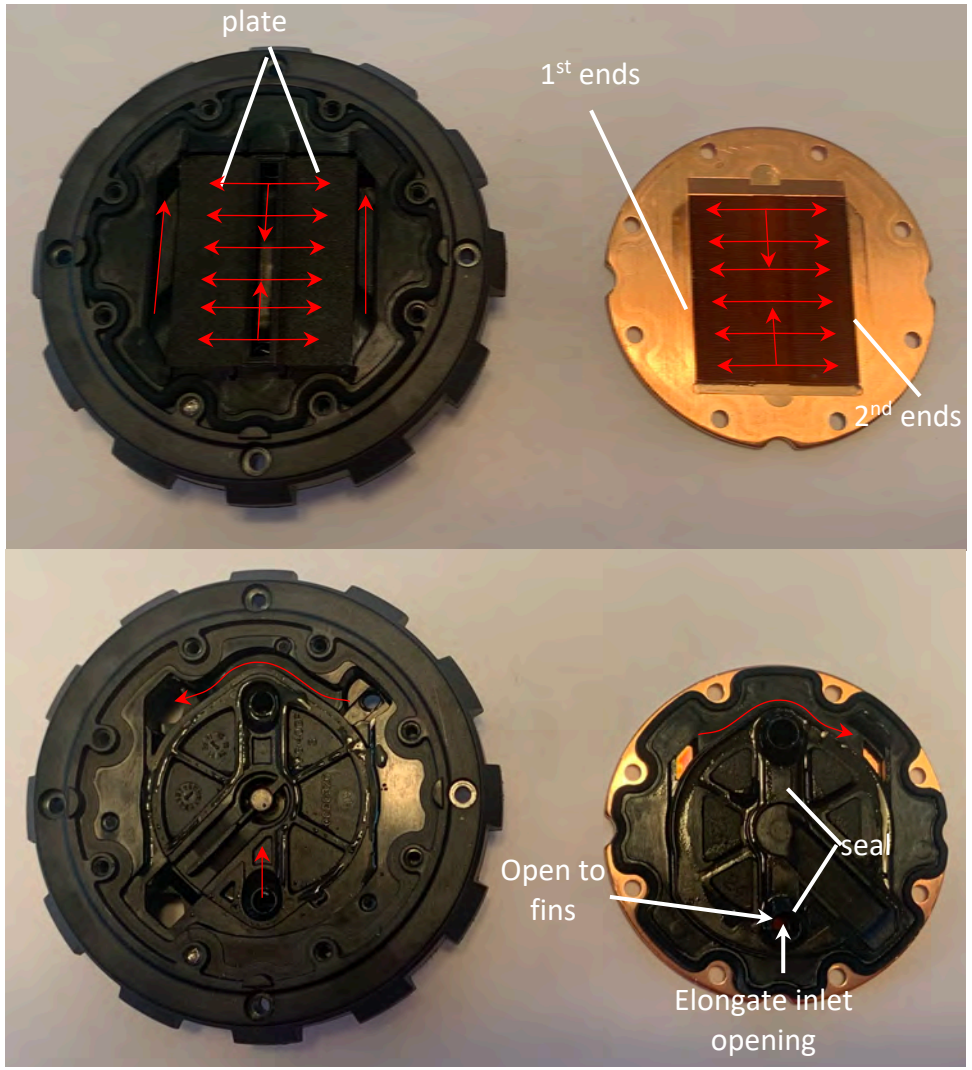
’266 Patent - Claim 13

’266 Patent Claim	Comparison to the H80i V2
13[a]. a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;	The H80i V2 device literally includes more than one wall, and this group of walls is spaced apart from each other, defining channels. And, the spacing between the walls define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the H80i V2 satisfies the plurality of walls limitation. For example, the H80i V2 device has several spaced-apart walls (e.g., right, shaded blue). The spacing between each pair of walls defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several walls define a plurality of microchannels that correspond to the walls. As shown to the right, a group of walls and microchannels are positioned beneath the opening (left) in the plate. Each wall in this group is exposed directly to liquid flowing from the opening through the plate. These walls are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “plurality of walls.” As shown in the bottom photograph (detail view of upper right photograph), each microchannel extends from a first end to a second end.



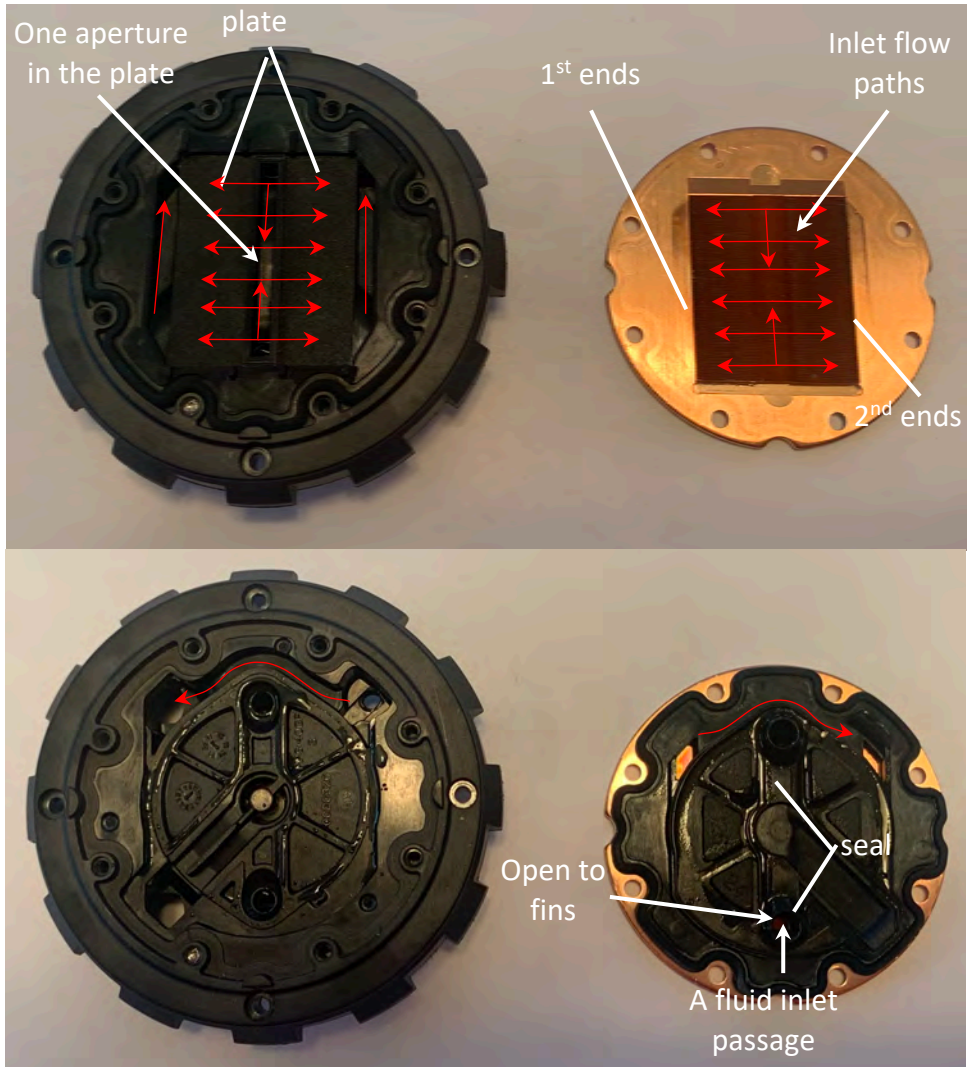
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to the H80i V2
13[b]. a plate overlying the walls; and a seal, wherein the seal is a portion of the plate;	The top left image shows a plate that overlies the plurality of walls, whether the plurality of walls is identified as the “split-flow fins” or another selected group of fins containing more than one fin. The lower right image shows the seal as being a separately identifiable structure that is formed as a unitary construct with the plate (upper left image). Thus, the seal constitutes a portion of the plate as claimed. See, ’266, col. 12:43-44 (“Seal 230 may be installed as a portion of the plate or separately.”); FIGS. 5 and 6 (illustrating the seal 230 as being structure that is continuous and monolithic with the plate 240 and tabs 242).



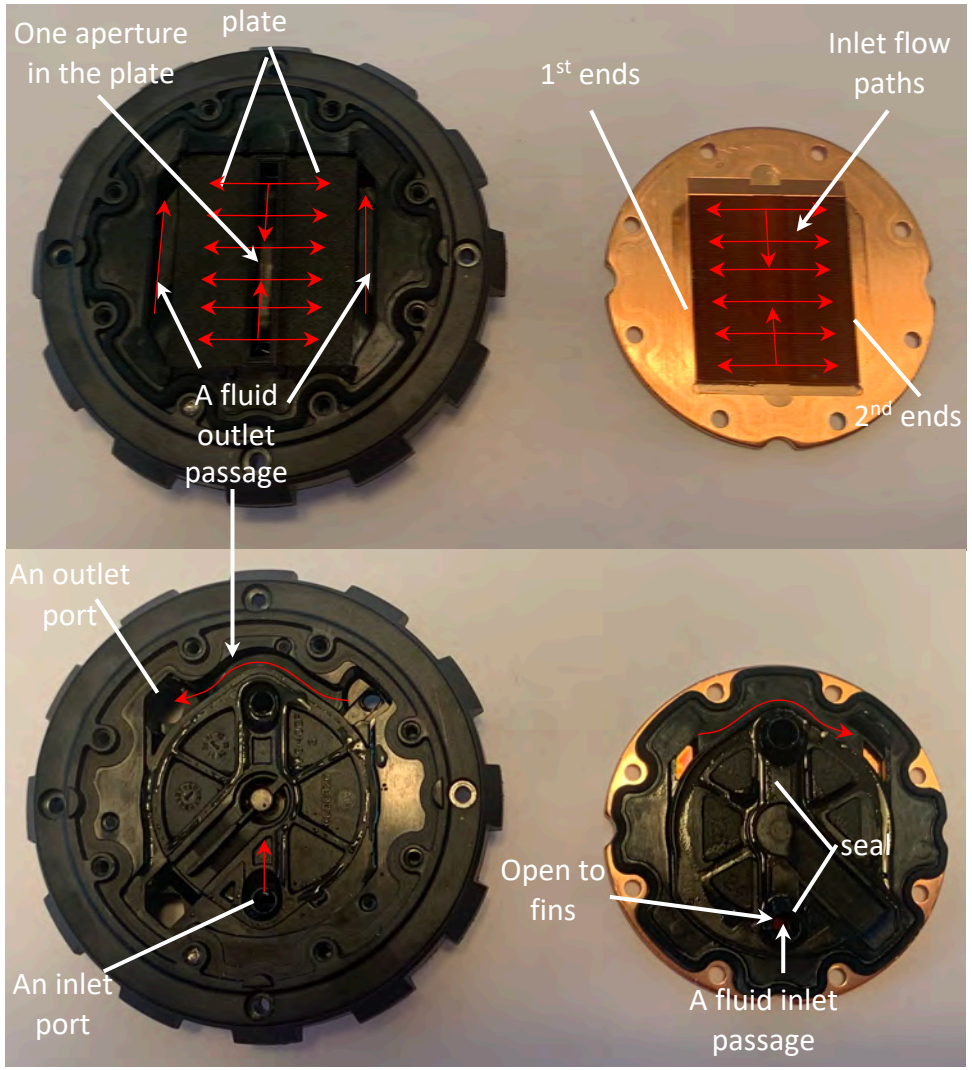
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to the H80i V2
13[c]. a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;	The lower right and upper left images show a portion of a fluid inlet passage that delivers coolant through one aperture in the plate to each microchannel (indicated by vertical red arrows in image at upper right). The fluid inlet passage delivers the heat-exchange fluid to each microchannel at a position between the first and second end of each respective microchannel (indicated by vertical red arrows in image at upper right).



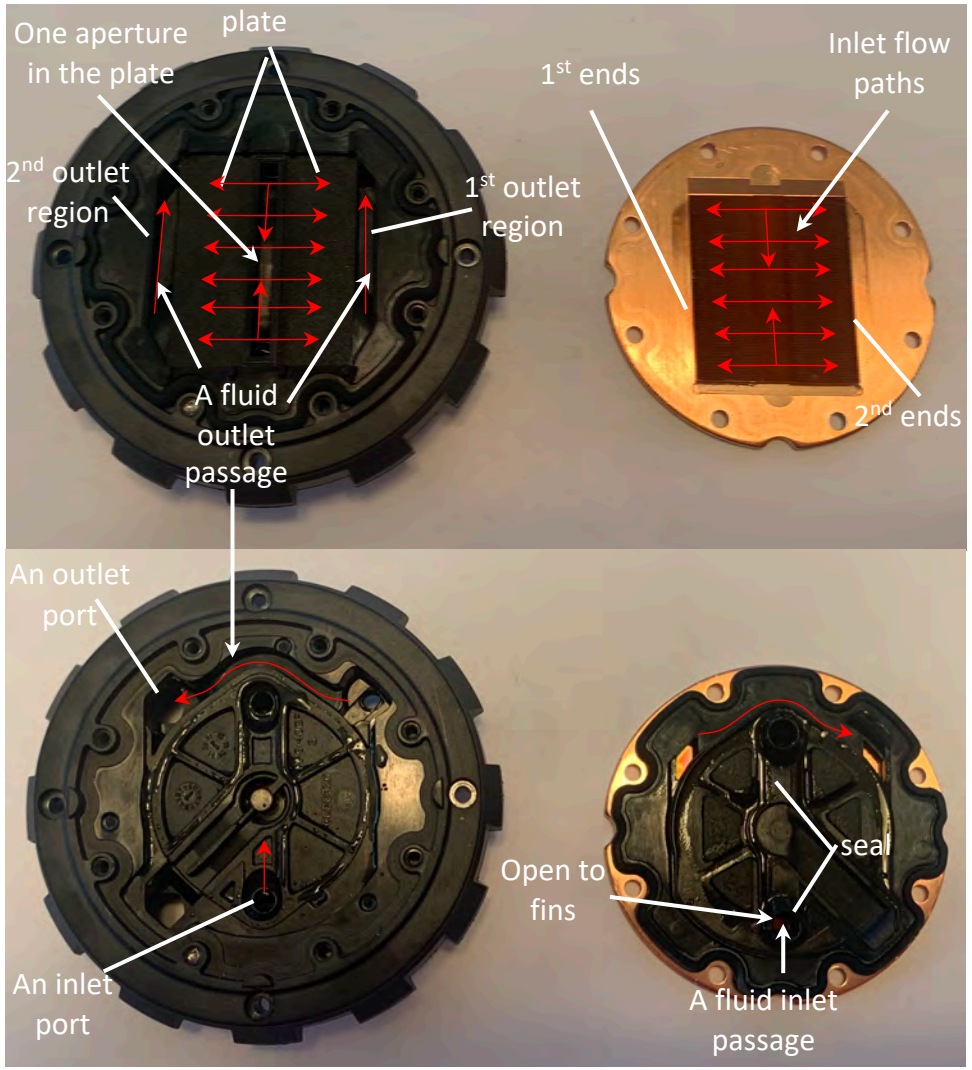
’266 Patent - Claim 13

’266 Patent Claim	Comparison to the H80i V2
13[d]. a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel,	The image at upper left shows a fluid outlet passage configured to receive the heat exchange fluid from the first end and the second end of each microchannel. As the red arrows in the upper right image indicate, the coolant enters the microchannels and bifurcates into two sub flows: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage (indicated by the curved red arrow at lower left, which is superimposed on the image at lower right) receives the coolant from both ends of each microchannel and delivers the coolant to the outlet port (lower left).



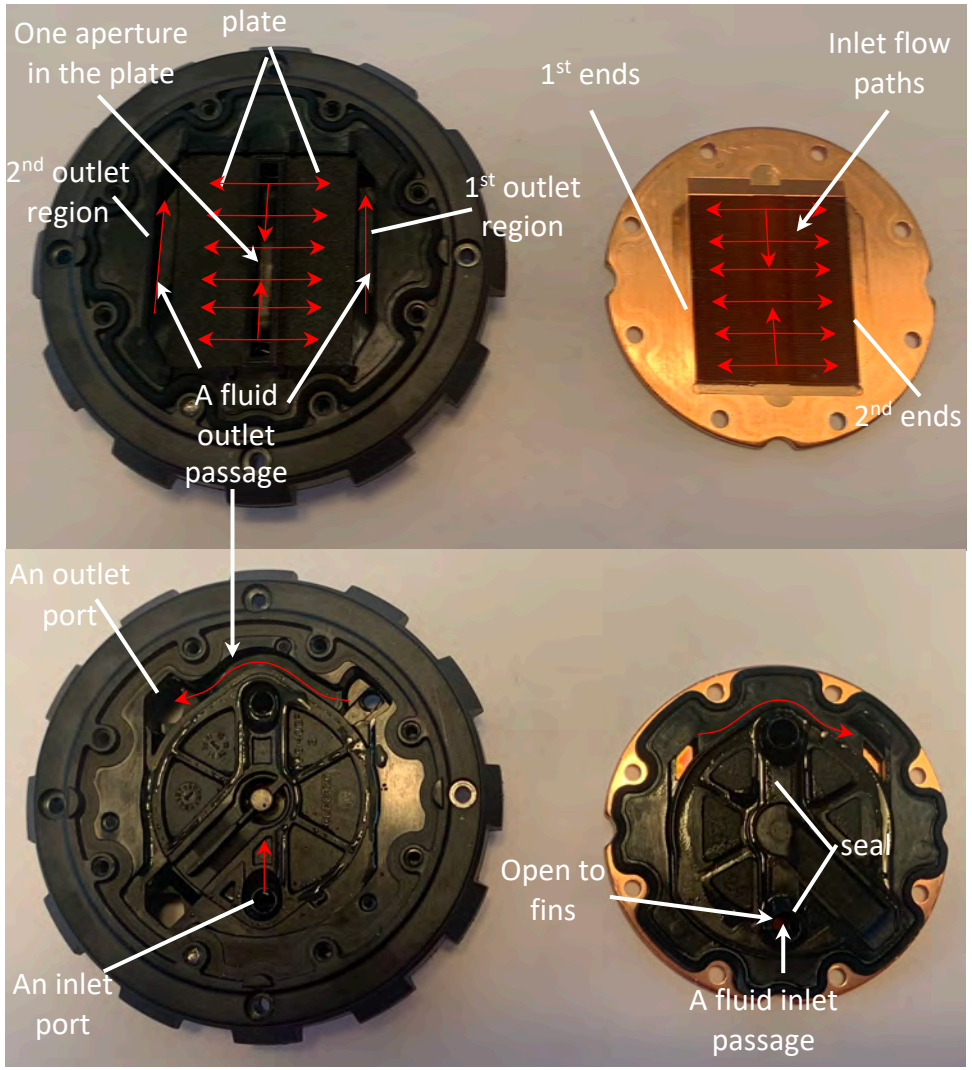
’266 Patent - Claim 13

’266 Patent Claim	Comparison to the H80i V2
13[d][1]. wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends,	The upper left image shows that the fluid outlet passage has a first outlet region positioned with no intervening solid structure between it and the microchannel first ends and a second outlet region positioned with no intervening solid structure between it and the microchannel second ends



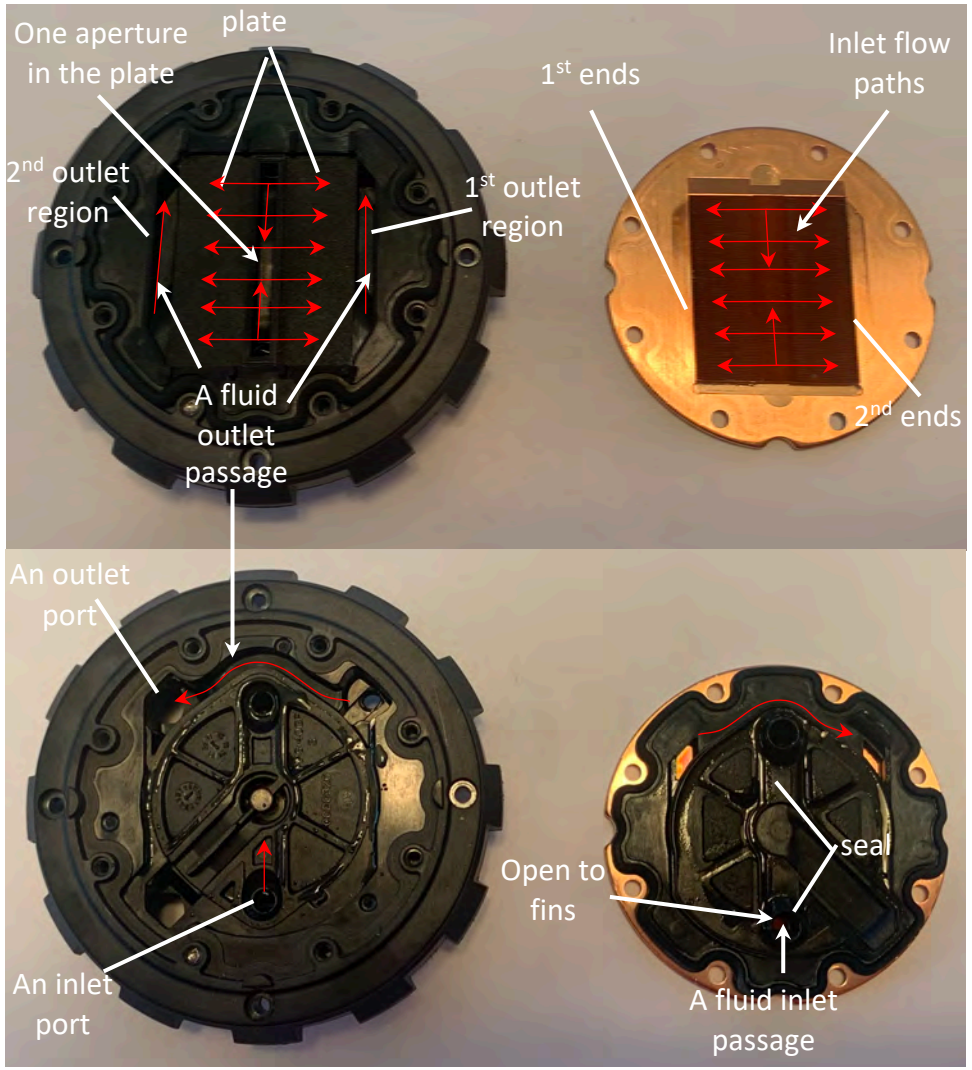
’266 Patent - Claim 13

’266 Patent Claim	Comparison to the H80i V2
13[d][2]. wherein the seal separates the fluid inlet passage from the fluid outlet passage;	The image at lower right shows that the seal separates the inlet passage from the outlet passage. Because of the seal’s position and fluid-tight engagement with the housing and the plate, coolant must flow through the microchannels as indicated by the red arrows (upper right image) before reaching the outlet passage, rather than short circuiting and bypassing the microchannels by flowing directly from the inlet passage to the outlet passage.



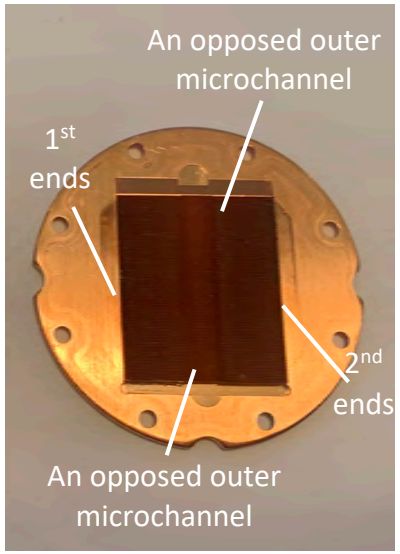
’266 Patent – Claim 13

’266 Patent Claim	Comparison to the H80i V2
13[d][3]. wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel,	As the red arrows in the upper right image indicate, the coolant enters each of the selected ”plurality of microchannels” and bifurcates into two sub flows within each microchannel: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.
13[d][4]. wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends,	As indicated in the upper left image, the first outlet region receives one of the two sub flows (outwardly facing red arrows at upper left and upper right) with no intervening solid structure between it and the microchannel first ends. Similarly, as shown in the upper left image, the second outlet region receives the other of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel second ends.
13[d][5]. wherein the two sub flows recombine in the outlet passage.	As indicated by the curved red arrows in the lower left and lower right images, the two sub flows from the 1st outlet region and the 2nd outlet region recombine in the outlet passage, e.g., near the outlet port, similar to a disclosed embodiment in the ’266 patent. See, e.g., ’266 patent, FIG. 2 (showing that the sub flows recombine near the outlet port 128).



’266 Patent – Claim 15

’266 Patent Claim	Comparison to the H80i V2
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	As shown at right, the plurality of microchannels includes at least two outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels. As shown at far right, the first outlet region includes an outlet opening from each microchannel and the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.



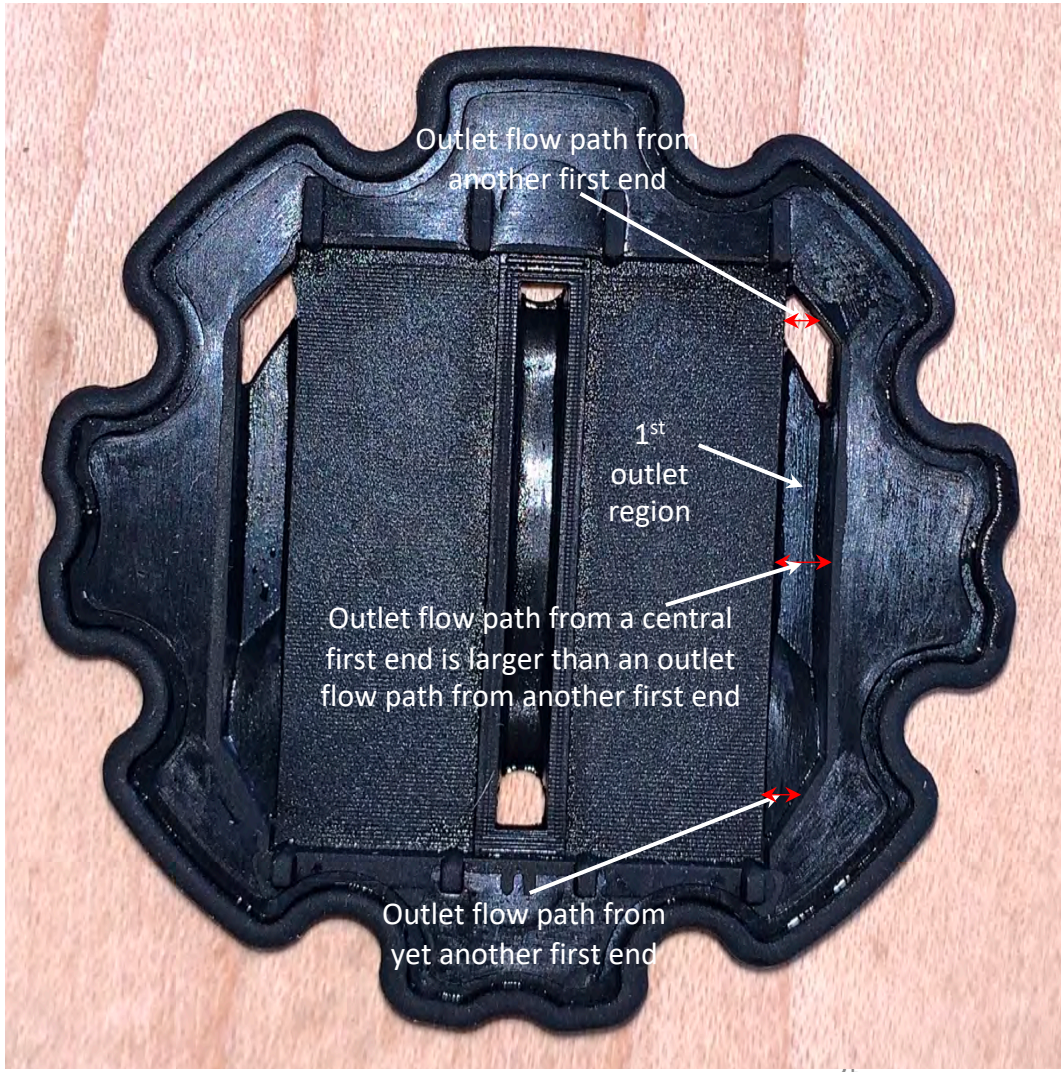
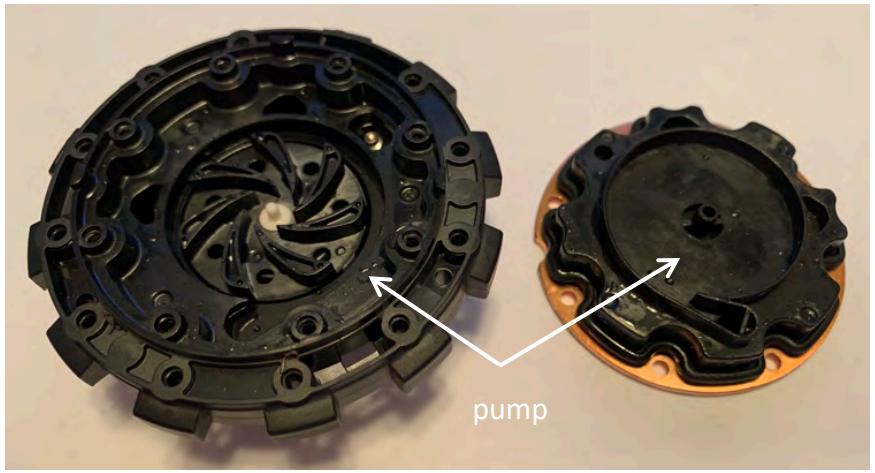


Exhibit D-3

Asetek Gen 6 (represented by a ROG STRIX LC 120 device)

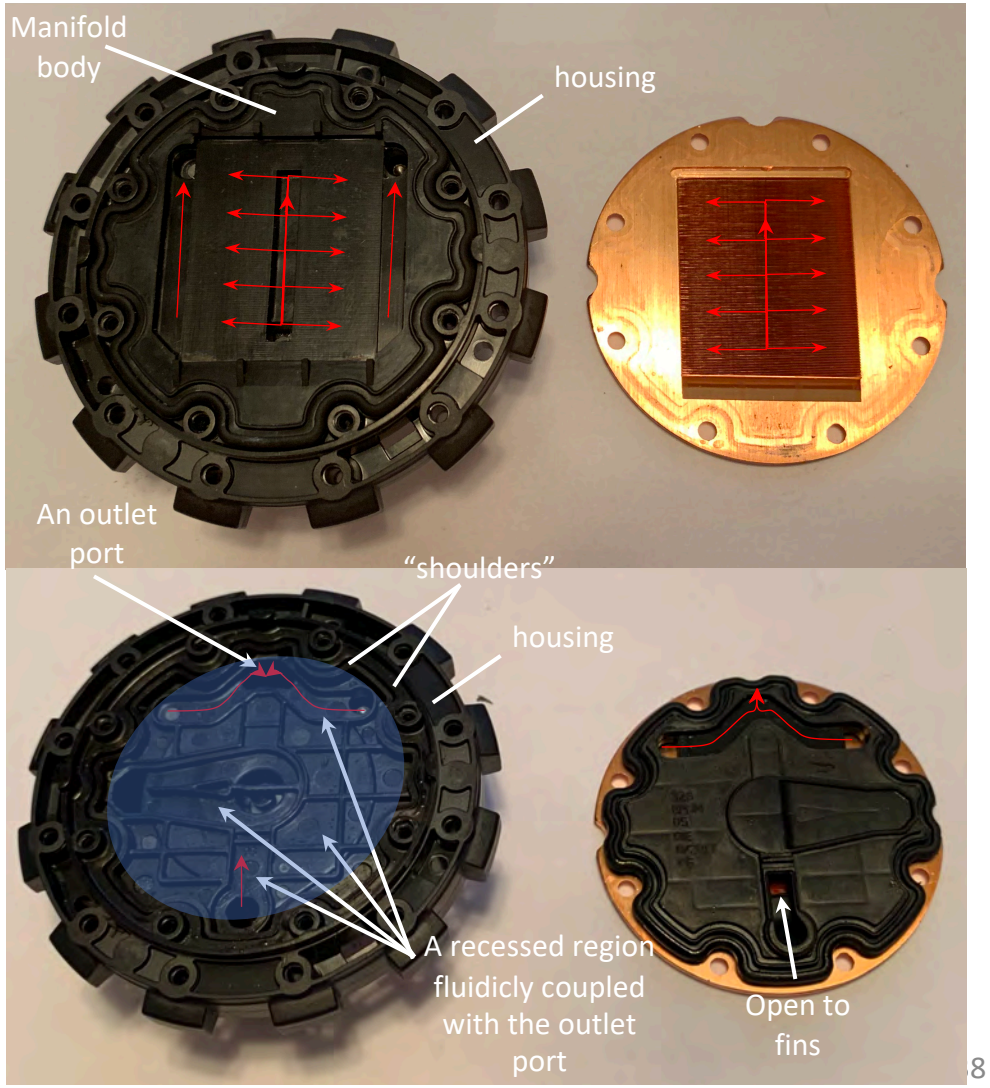
’266 Patent - Claim 1

’266 Patent Claim	Comparison to ROG Device
1. A heat exchange system comprising:	The ROG device is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



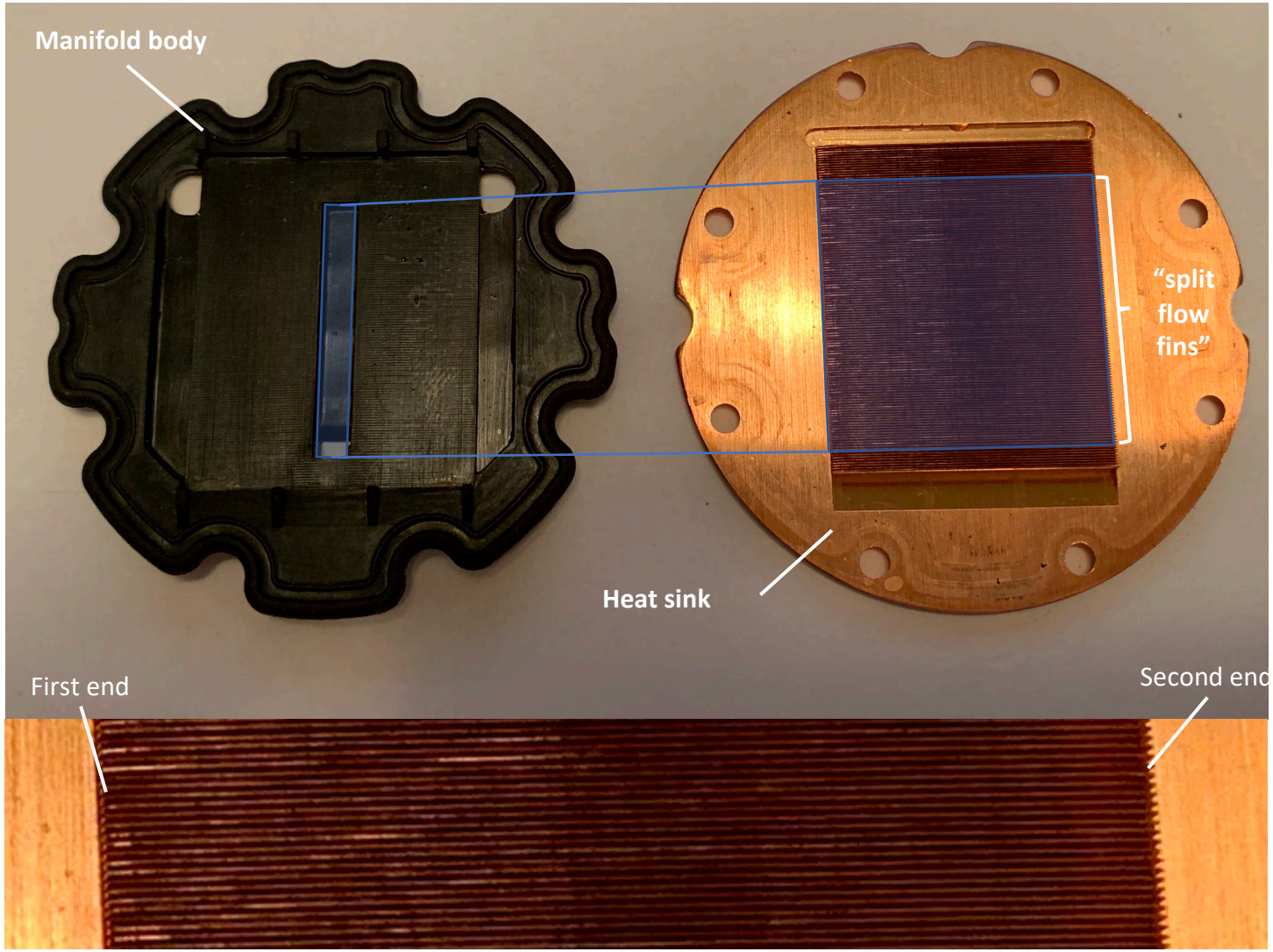
’266 Patent - Claim 1

’266 Patent Claim	Comparison to ROG Device
1[a]. a housing defining a recessed region and an outlet port fluidicly coupled with the recessed region;	The ROG device defines a recessed region and an outlet port fluidicly coupled with the recessed region. The upper left and lower left images show the housing. At lower left, the outlet port is identified. The recessed region identified by the blue shading sits below and is set back from both “shoulders” that extend around the fluted perimeter of the identified recessed region. As shown at upper left, a manifold body rests in the identified recessed region, leaving portions of the identified recessed region unoccupied to permit coolant to flow into and through the microchannels (identified by the red arrows at upper left and upper right) before exiting the microchannels and flowing into the outlet port along the paths identified by the upwardly pointing red arrows at upper left and the curved arrows shown at lower left. Thus, the recessed region identified by the blue shading is fluidicly coupled with the outlet port. As well, the housing defines other recessed regions as identified at lower left that are set back from the perimeter “shoulders” and that remain unoccupied by the manifold body. As indicated by the red arrows, fluid passes through each identified recessed region as it flows through the cold-plate module toward and ultimately through the outlet port.



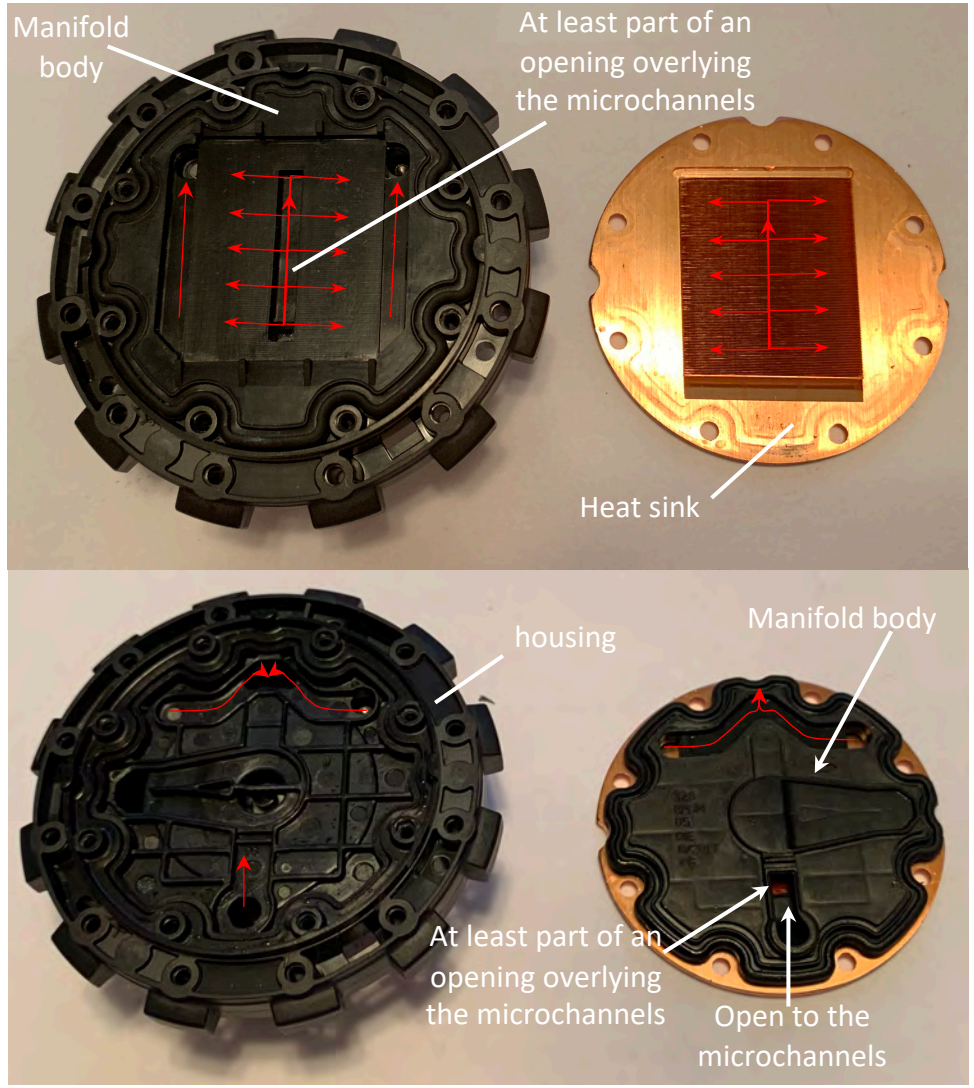
’266 Patent - Claim 1

’266 Patent Claim	Comparison to ROG Device
1[b]. a heat sink having a plurality of juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins;	The heat sink of the ROG device literally includes more than one fin, and this group of fins is spaced apart from each other without any intervening solid structure between them. And, the spacing between the fins define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the ROG device satisfies the plurality of juxtaposed fins limitation. For example, the ROG device has a heat sink with a plurality of juxtaposed fins (e.g., each fin in the plurality of fins has no intervening solid structure between it and the next fin; right, shaded blue). The spacing between each pair of fins defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several spaced apart fins define a plurality of microchannels that correspond to the plurality of juxtaposed fins. As shown to the right, a group of juxtaposed fins and the corresponding plurality of microchannels are positioned beneath the opening (left, blue rectangle) in the manifold body. Each fin in this group is exposed directly to liquid flowing from the opening through the plate. These fins are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins.”



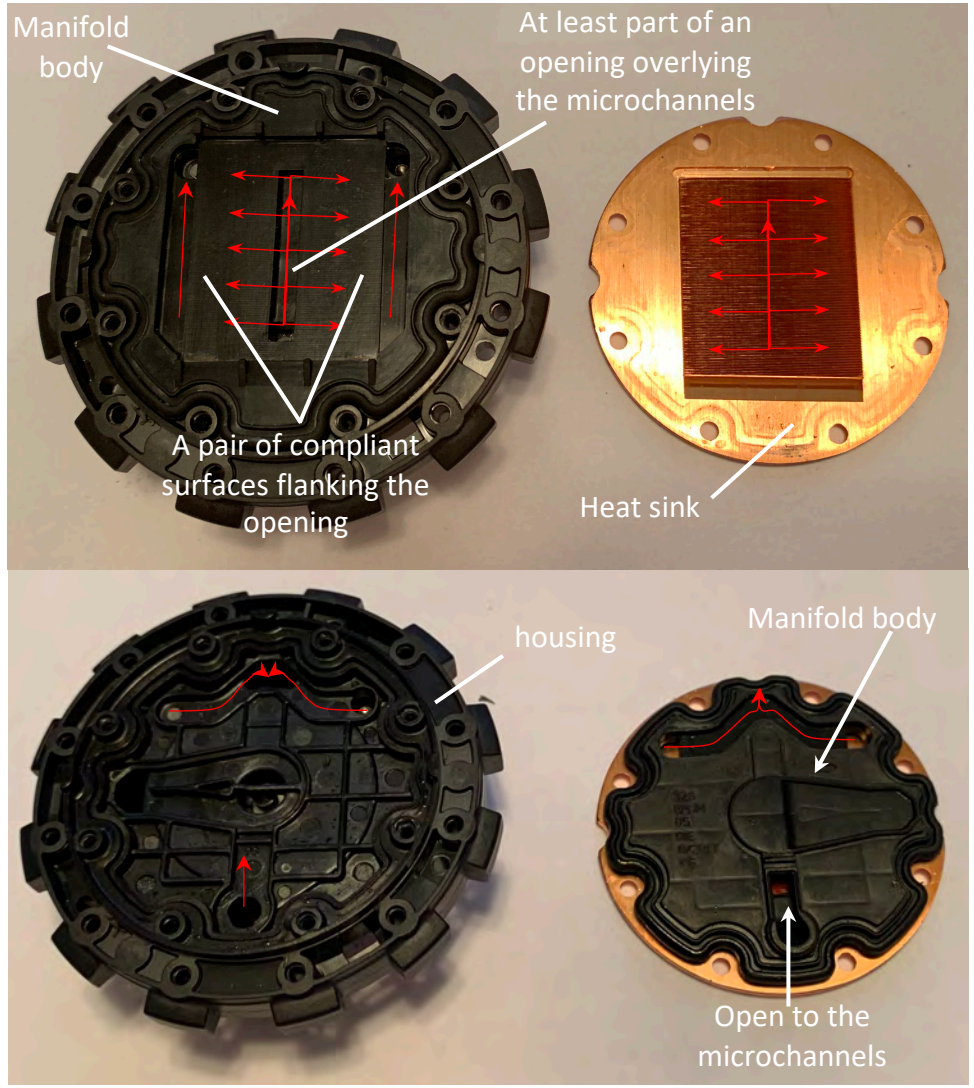
’266 Patent - Claim 1

’266 Patent Claim	Comparison to ROG Device
1[c]. a manifold body at least partially defining an opening overlying the microchannels,	As shown at upper left, the ROG device includes a manifold body. As shown at lower right, the manifold body overlies the microchannels, regardless of which definition of “plurality of fins” is used. As shown at upper left, the manifold body defines at least part of an opening positioned over the microchannels. This is shown at lower right (note that the fins defining the microchannels are visible through the manifold body).



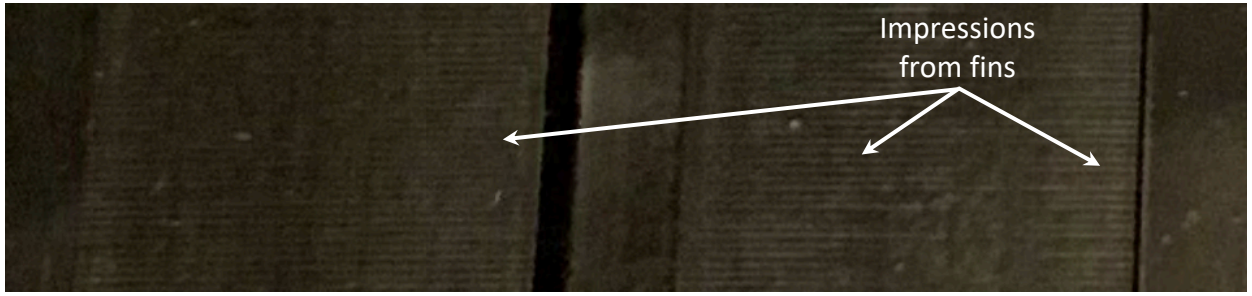
’266 Patent - Claim 1

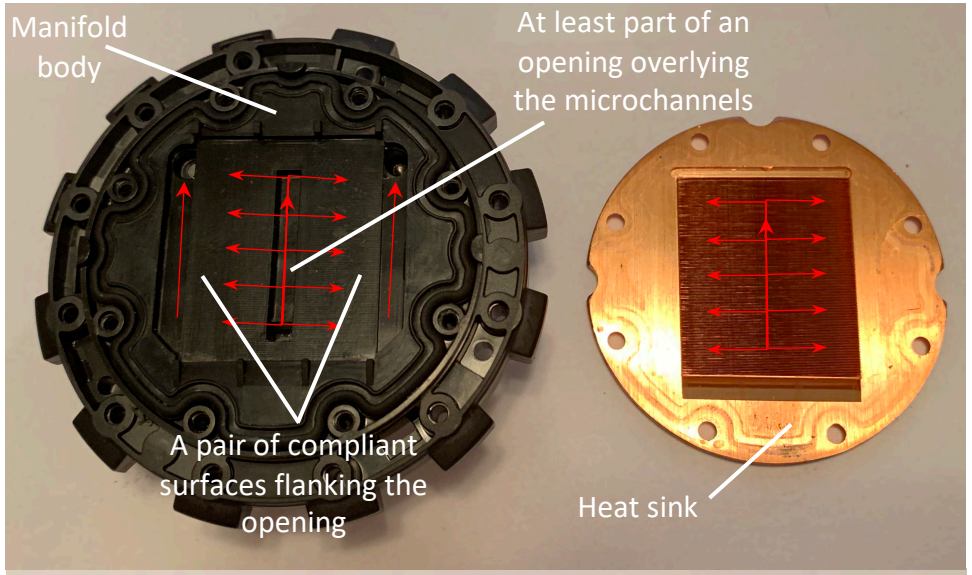
’266 Patent Claim	Comparison to ROG Device
1[d]. wherein the manifold body defines a pair of compliant surfaces flanking the opening,	At upper left, the ROG device’s pair of compliant surfaces are shown flanking the opening.

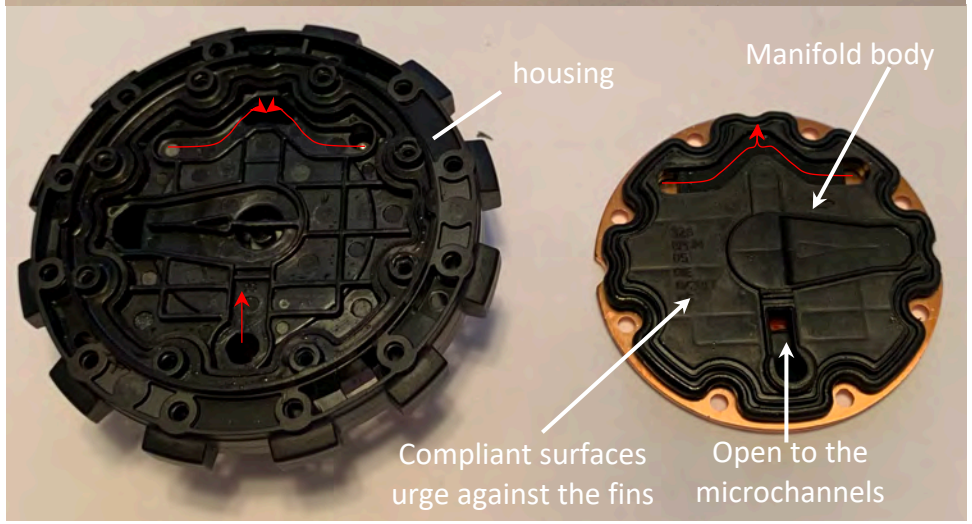


’266 Patent - Claim 1

’266 Patent Claim	Comparison to ROG Device
1[e]. wherein the compliant surfaces urge against the fins, defining a flow boundary of the microchannels,	When assembled as shown immediately below, the ROG’s cold-plate module compresses the manifold body (top left and lower right) between the heat sink and the housing, which urges the compliant surfaces against the fins and defines a flow boundary of the microchannels. As shown below, on disassembly, the compliant surfaces have impressions (e.g., horizontal lines / depressions) arising from being compressed between the housing and the top edges of the fins.

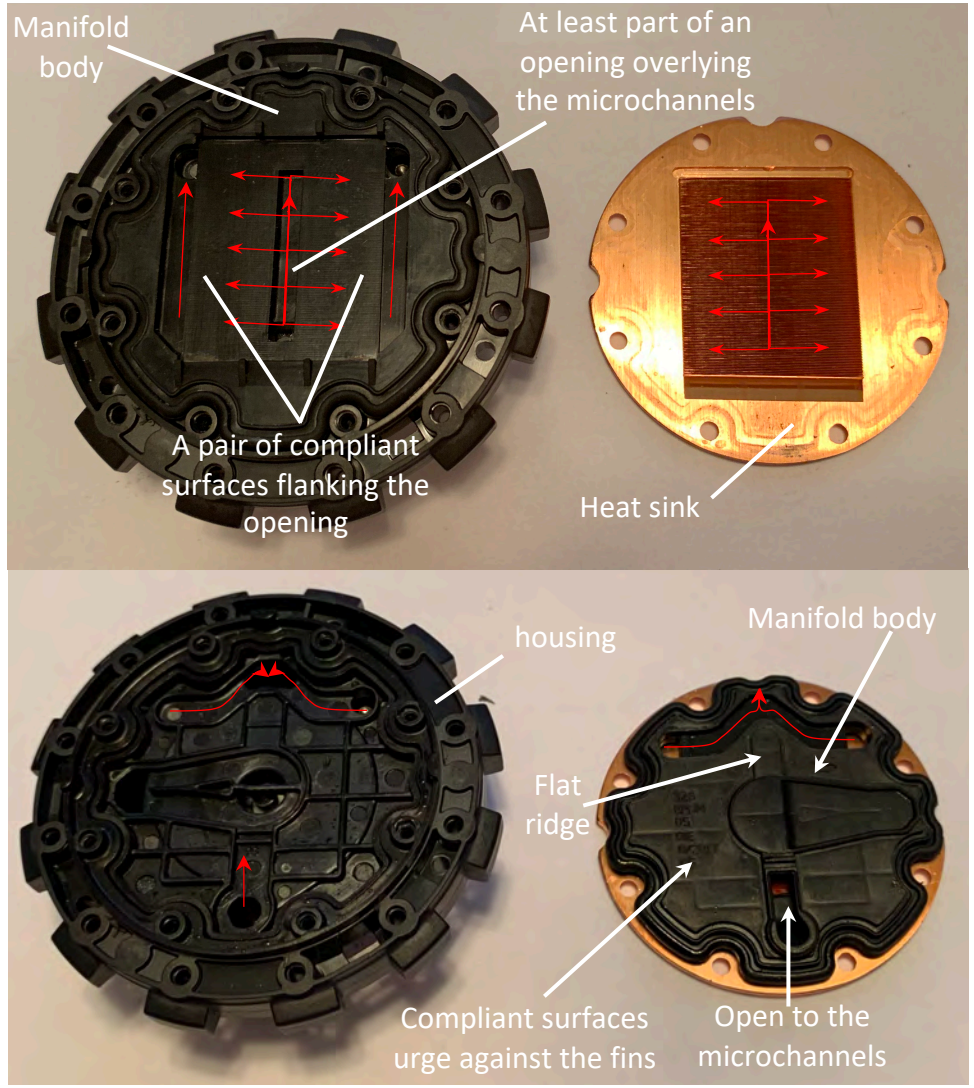






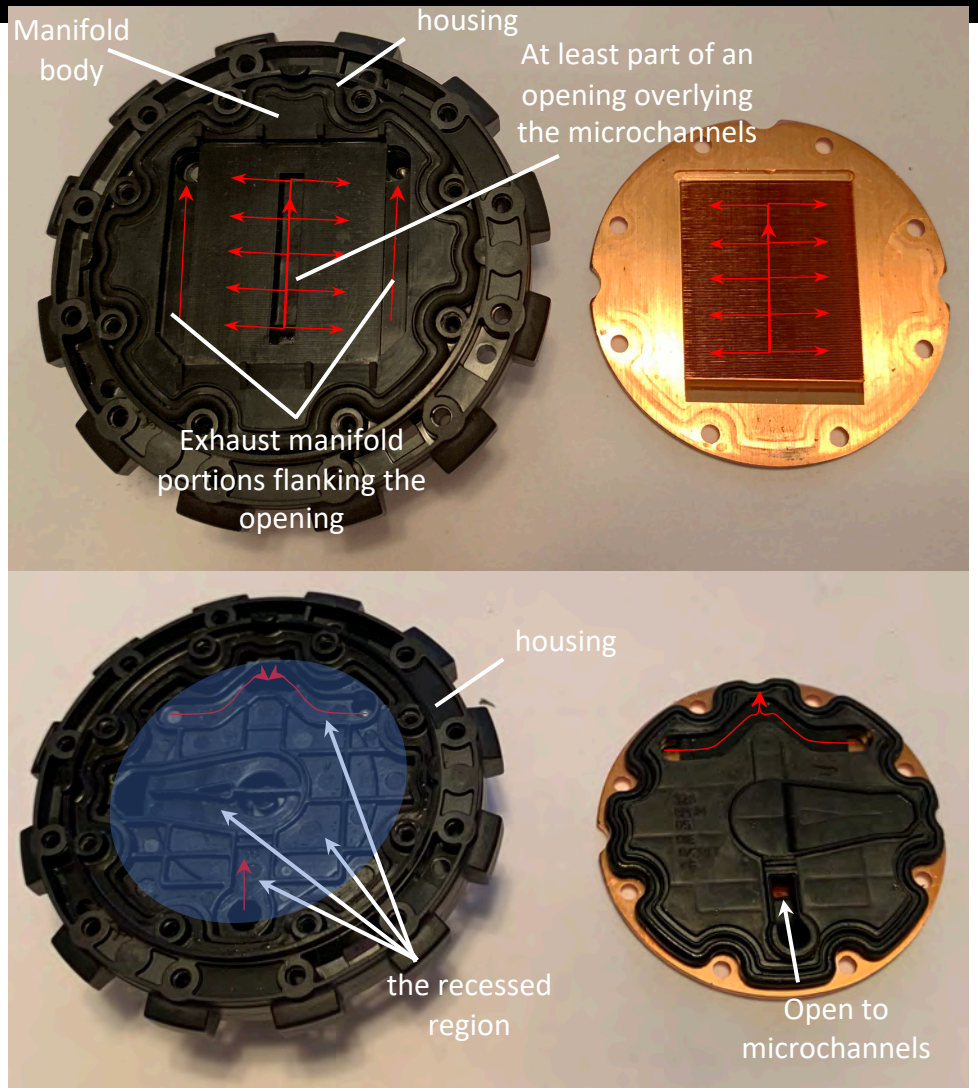
’266 Patent - Claim 1

’266 Patent Claim	Comparison to ROG Device
1[f]. wherein the opening extends transversely relative to the fins and is configured to distribute a working fluid among the microchannels,	As the upper left image shows, the opening extends transversely (e.g., across the tops of) the fins. The upwardly directed red arrow (center) shown at upper left lies within the opening (e.g., as a longitudinal axis of the opening) and is superimposed over the fins in the upper right image to indicate a flow of a working fluid being distributed among the microchannels. Further, the fins in the image at lower right are oriented as shown in the image at the upper right (note fins are visible below center in the lower right image). The lower right image clearly shows that the longitudinal axis of the opening extends transversely to the fins. Still further, the flat ridge shown in the lower right image corresponds to a portion of the opening that overlies the fins, further demonstrating that the opening extends transversely overtop the fins, which distributes a working fluid among the microchannels as the fluid passes through the opening into the microchannels during operation.



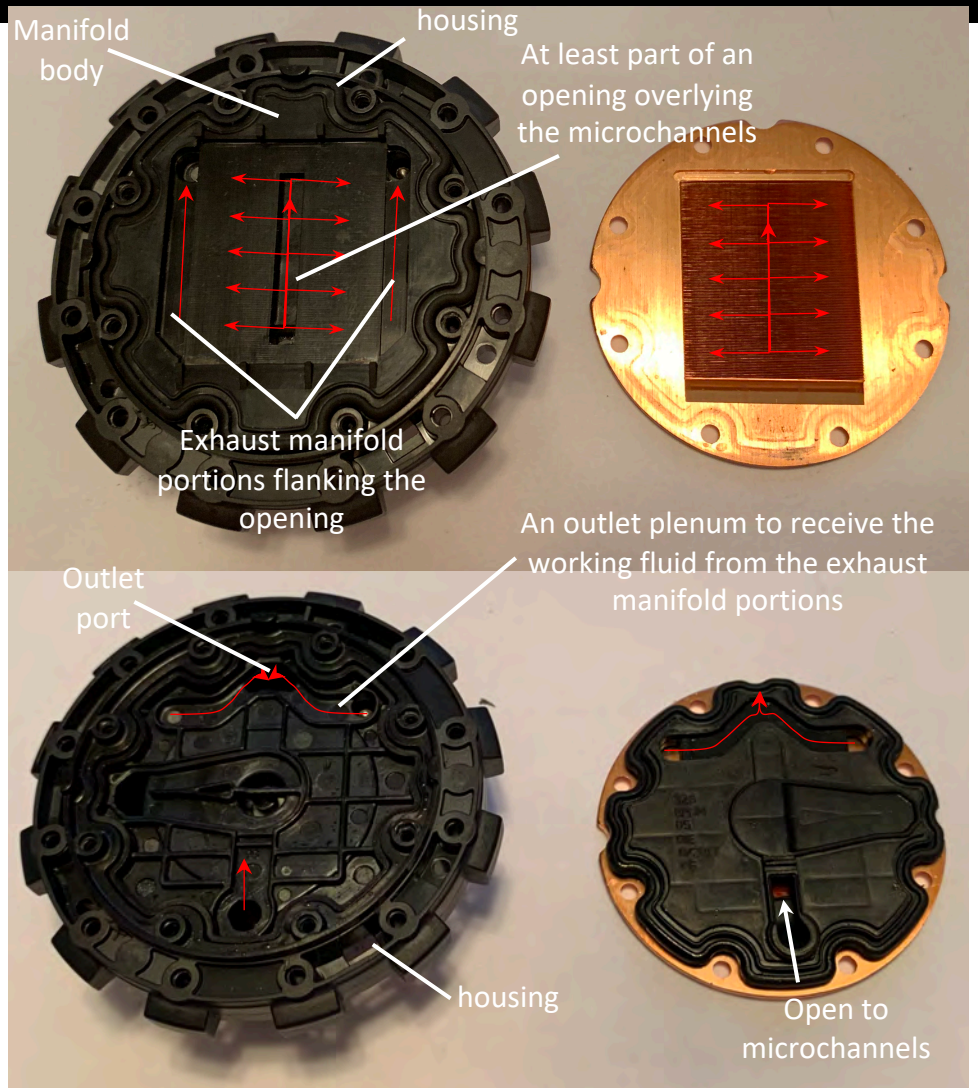
’266 Patent - Claim 1

’266 Patent Claim	Comparison to ROG Device
1[g]. wherein the manifold body partially occupies the recessed region of the housing, leaving a pair of opposed portions of the recessed region unfilled, defining opposed exhaust manifold portions flanking the opening and being configured to receive the working fluid from the microchannels, and	The upper left image shows the manifold body positioned within and thus partially occupying the recessed region of the housing (e.g., shown at lower left), regardless of which recessed region defined by the housing is selected. In leaving a pair of opposed portions of the selected recessed region unfilled, the manifold body defines opposed exhaust manifold portions flanking the opening, as shown at upper left. The outwardly directed red arrows shown at upper right indicate a flow of the working fluid through the microchannels. The outwardly directed red arrows are superimposed on the image at upper right, showing that the outwardly directed flows of the working fluid through the microchannels enter the opposed exhaust manifold portions. Thus, the opposed exhaust manifold portions flanking the opening are configured to receive the working fluid from the microchannels, as claimed.



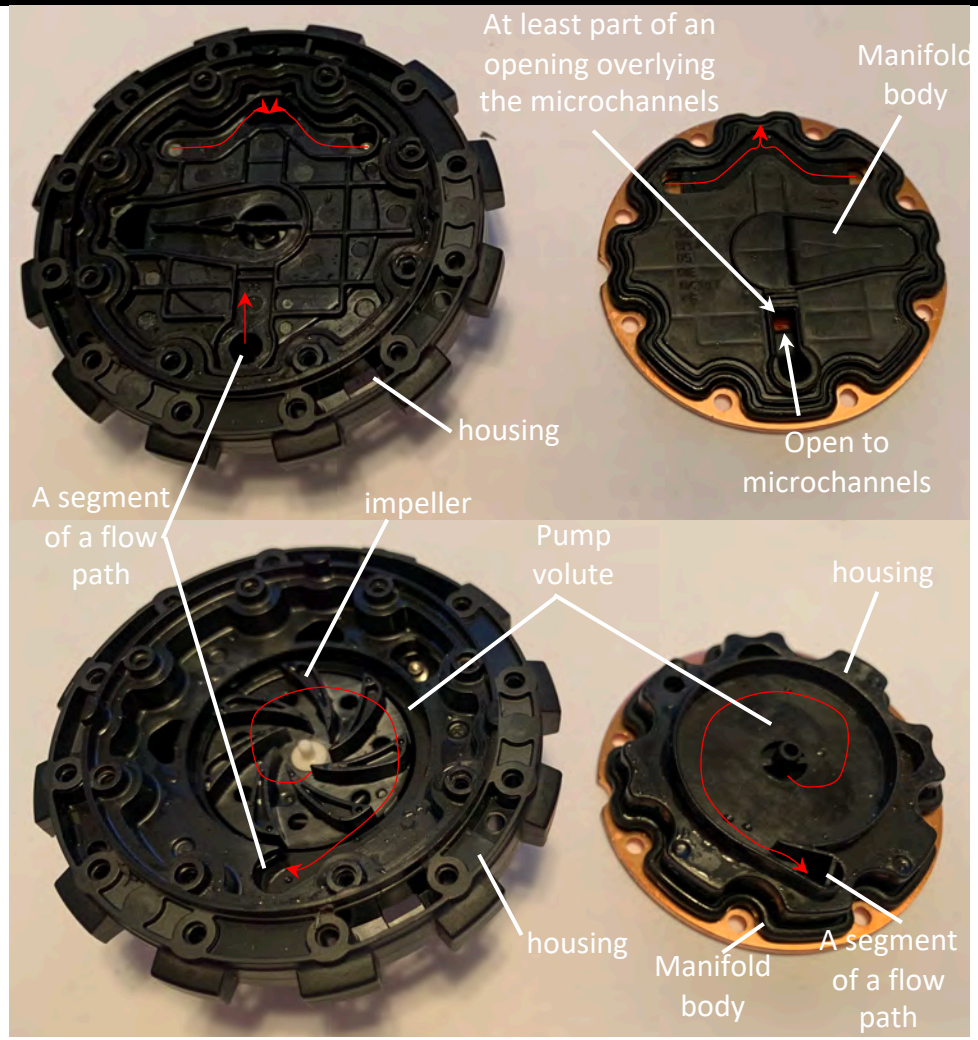
’266 Patent - Claim 1

’266 Patent Claim	Comparison to ROG Device
1[h]. wherein the housing further defines an outlet plenum configured to receive the working fluid from the exhaust manifold portions and to convey the working fluid to the outlet port.	The image at lower left shows an outlet plenum that receives the working fluid from the exhaust manifold portions. The outlet plenum conveys the working fluid to the outlet port.



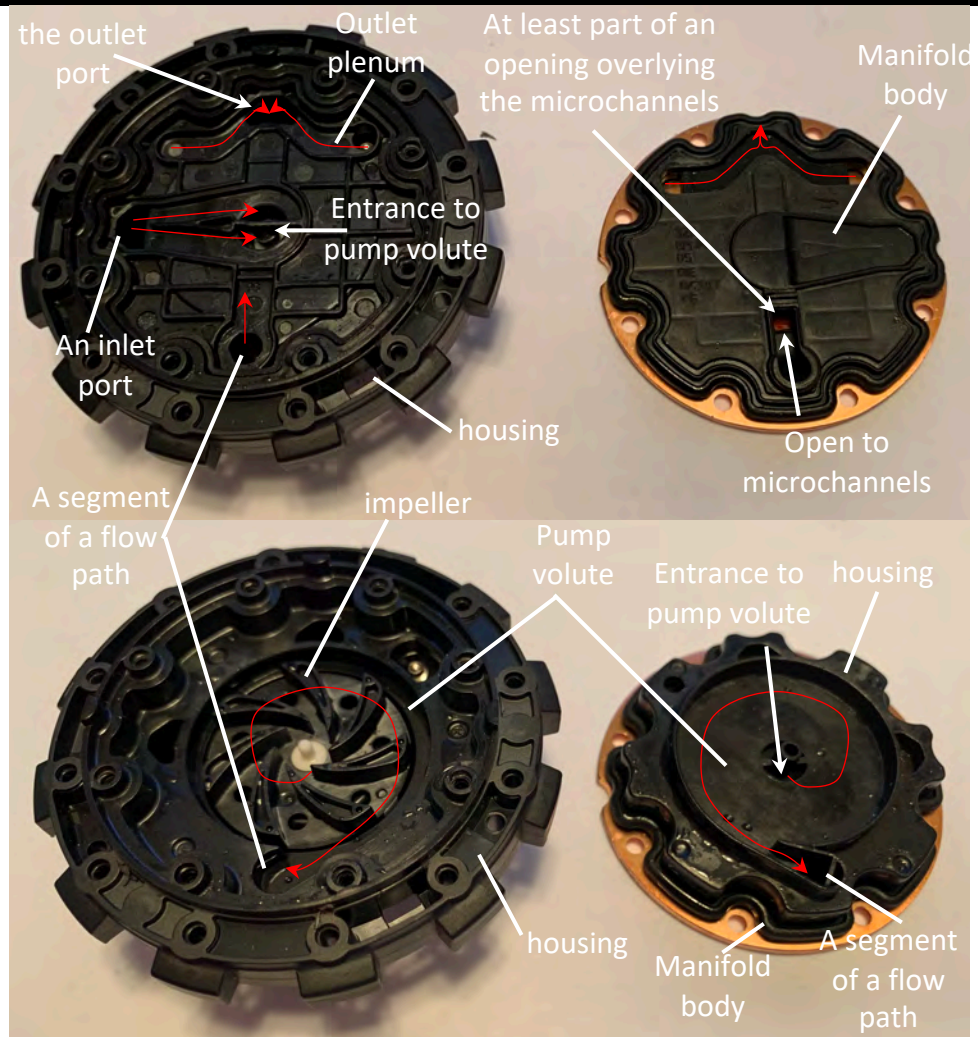
’266 Patent - Claim 2

’266 Patent Claim	Comparison to ROG Device
2. The heat exchange system according to claim 1, wherein the housing defines a pump volute and a segment of a flow path, the segment configured to convey the working fluid from the pump volute to the opening at least partially defined by the manifold body, the heat exchange system further comprising an impeller positioned in the pump volute and configured to urge the working fluid along the flow path.	The upper left image shows the housing. In the lower left image, a piece of the housing has been removed. (The lower right image shows the removed piece.) The lower left and the lower right images show the pump volute defined by the housing. As well, the housing defines a segment of a flow path configured to convey the working fluid from the pump volute to the opening defined in part by the manifold body. For example, the outwardly spiraling red arrows (lower left, lower right) indicate a swirling flow of the working fluid as it passes through and out of the pump volute along the segment. The vertical red arrow in the upper left image depicts a flow of the working fluid from the pump volute along the flow path segment that passes into the opening (shown at upper right) overlying the microchannels.



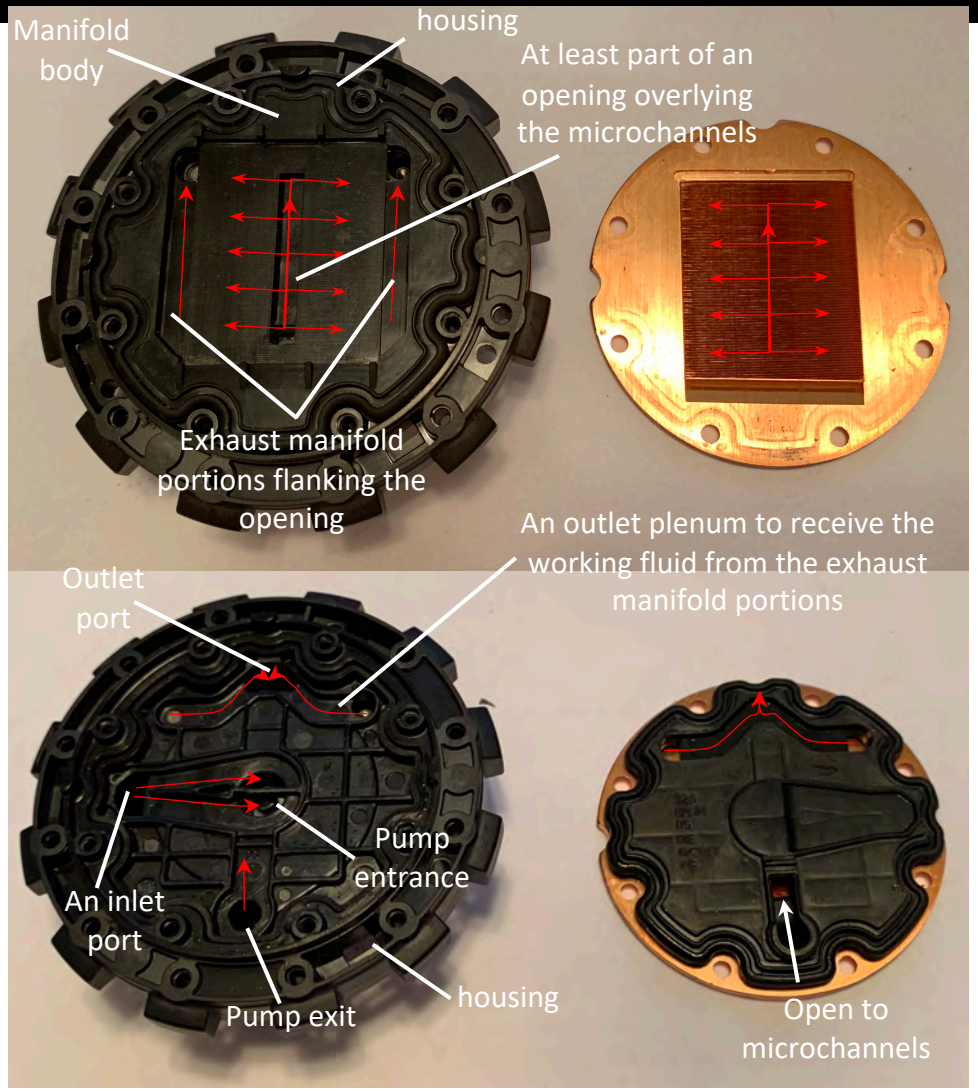
’266 Patent - Claim 5

’266 Patent Claim	Comparison to ROG Device
5. The heat exchange system according to claim 2, wherein the housing defines an inlet port, wherein the flow path extends from the inlet port to the outlet port and is configured to convey the working fluid from the inlet port through the pump volute, the manifold body, the microchannels, the opposed exhaust manifold portions, and the outlet plenum to the outlet port.	The upper left image shows an inlet port and the outlet port. The red arrows indicate the path that the working fluid follows through the cold-plate module of the ROG device. As indicated at upper left, the fluid enters from the inlet port and flows through a channel into an entrance to the pump volute (also see lower right). On entering the pump volute (lower left; lower right), the spinning impeller (lower left) imparts momentum to the working fluid, which exits the pump volute along the indicated segment of the flow path (spiraling red arrow at lower left; vertical red arrow at lower center of upper left image), passing through the manifold body (upper right image) and entering the microchannels (upper right image). The opposed exhaust manifold portions (not shown on this slide, shown previously; flow path indicated by straight red arrows) collect the working fluid from the microchannels and the working fluid follows the flow path into the outlet plenum (curved red arrows in upper left image), which conveys the working fluid to the outlet port (upper left).



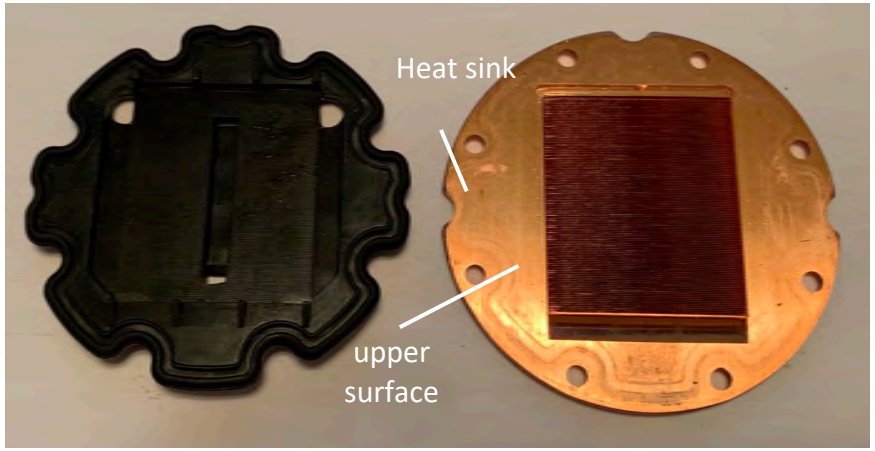
’266 Patent - Claim 9

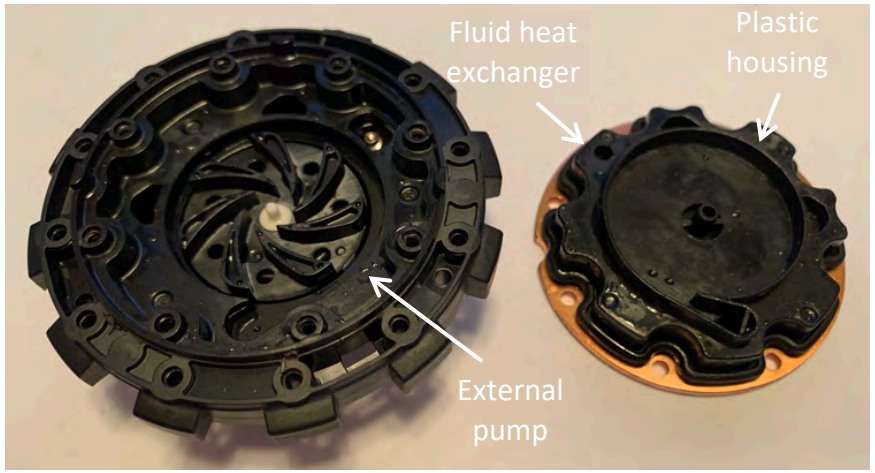
’266 Patent Claim	Comparison to ROG Device
9. The heat-exchange module according to claim 1, wherein a flow of the working fluid defines a flow path, wherein the flow path is distributed among the plurality of microchannels, and, within each microchannel, the flow path bifurcates into a pair of opposed sub-flow paths directed away from each other.	Coolant flow through the ROG device defines a flow path. Red arrows superimposed on the images at right indicate the flow path. After exiting the pump (below center of lower left image), the coolant passes into the opening overlying the microchannels (indicated by central, upwardly directed red arrow at upper left). As the coolant flows over top the microchannels, the coolant flow (and thus the path the flow defines) is distributed among the plurality of microchannels, as indicated by the upwardly directed red arrow superimposed on the upper right image. The coolant flow enters each of the microchannels and, within each microchannel, splits (or bifurcates) into outwardly directed sub-flows (indicated by the outwardly directed red arrows superimposed on the upper right image). Thus, the coolant flow defines a flow path that bifurcates within each microchannel into a pair of opposed sub-flow paths directed away from each other, as claim 9 recites.



’266 Patent - Claim 13

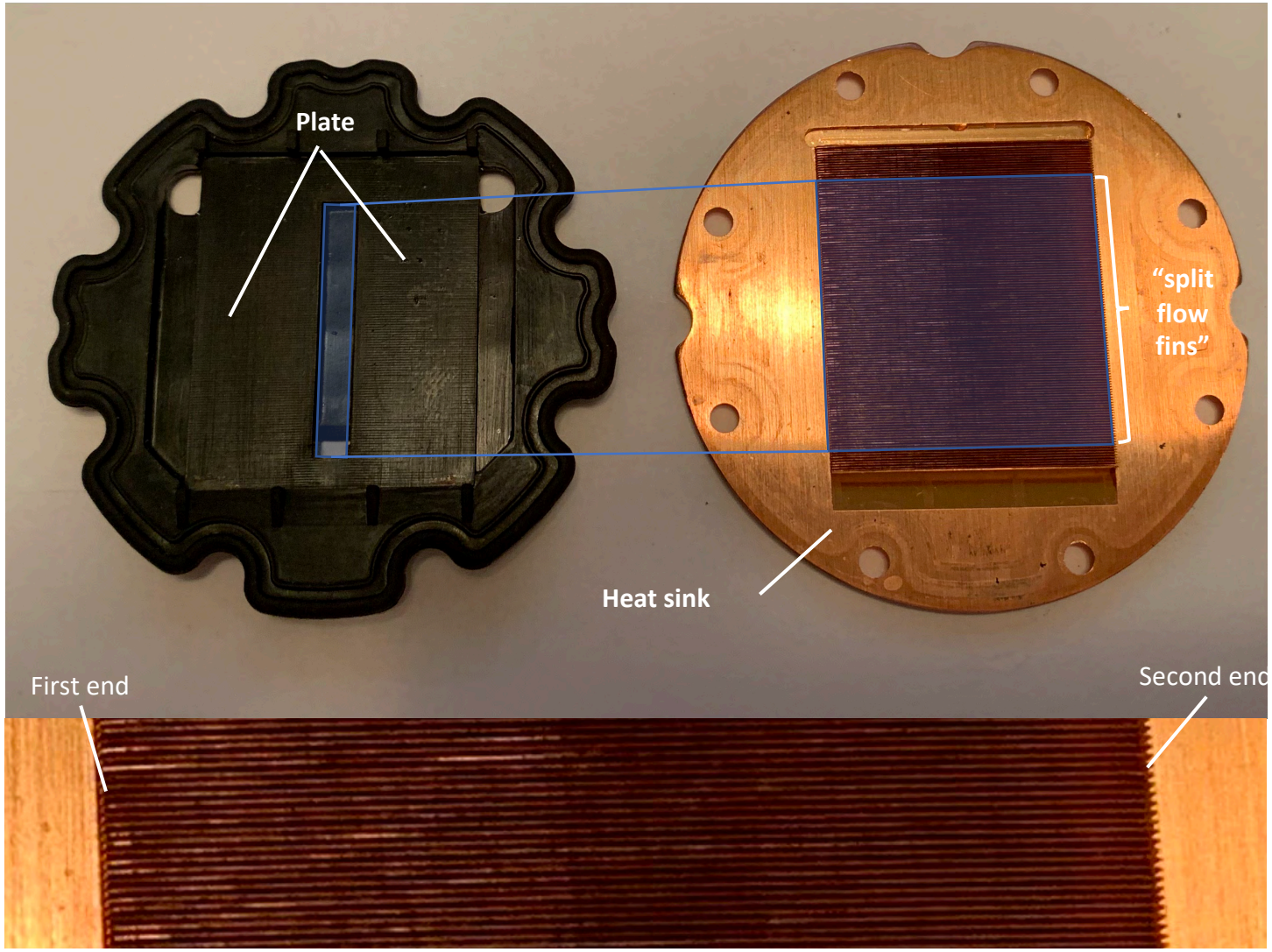
’266 Patent Claim	Comparison to ROG Device
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The ROG device includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the ROG device has a copper heat sink and a housing separable from the pump. Thus, the ROG device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component." As shown to the right, the pump is external to the component that transfers heat from a heat source to a cooling liquid. The plastic housing can be sectioned parallel to the copper plate to define a pump external to the component (e.g., below the plane of the section).





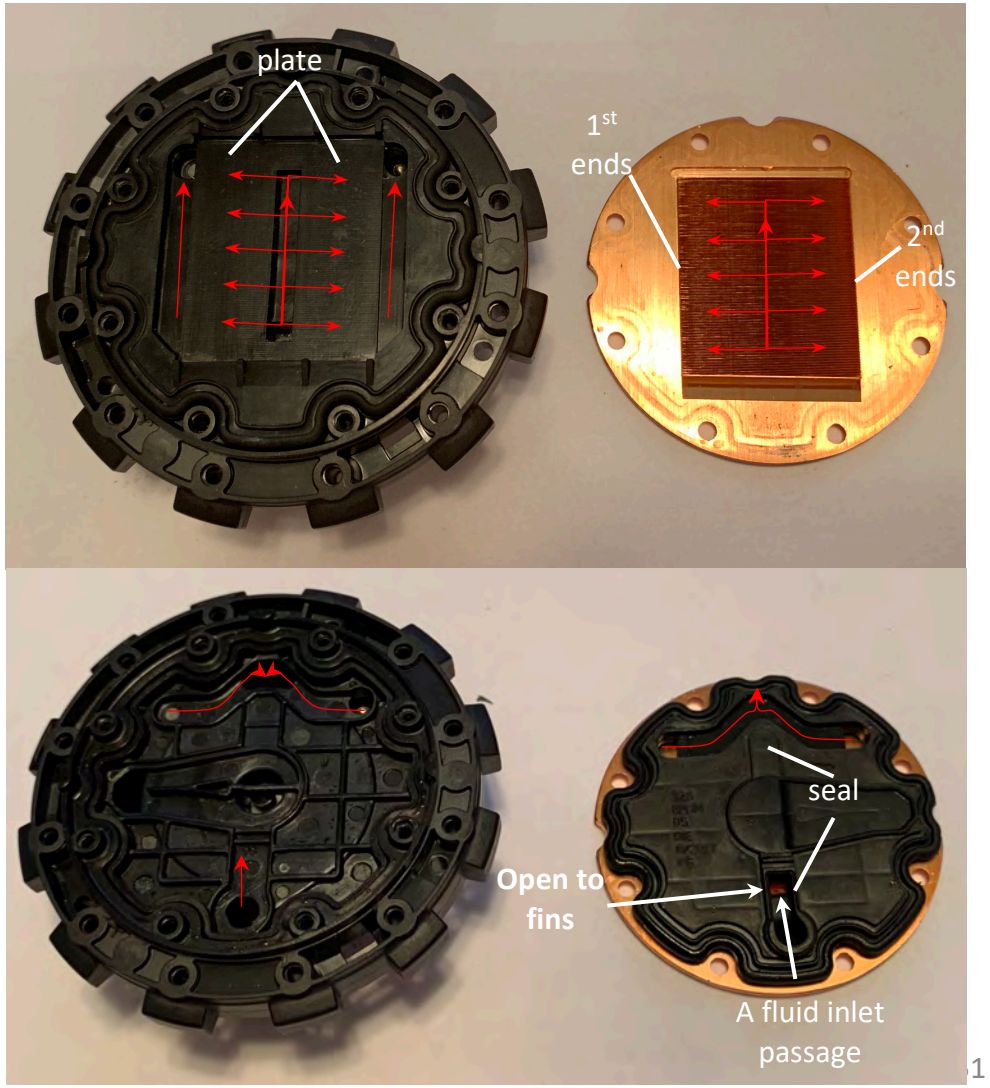
’266 Patent - Claim 13

’266 Patent Claim	Comparison to ROG Device
13[a]. a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;	The ROG device literally includes more than one wall, and this group of walls is spaced apart from each other, defining channels. And, the spacing between the walls define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the ROG device satisfies the plurality of walls limitation. For example, the ROG device has several spaced-apart walls (e.g., right, shaded blue). The spacing between each pair of walls defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several walls define a plurality of microchannels that correspond to the walls. As shown to the right, a group of walls and microchannels is positioned beneath the opening (left) in the plate. Each wall in this group is exposed directly to liquid flowing from the opening through the plate. These walls are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “plurality of walls.” As shown in the bottom photograph (detail view of upper right photograph), each microchannel extends from a first end to a second end.



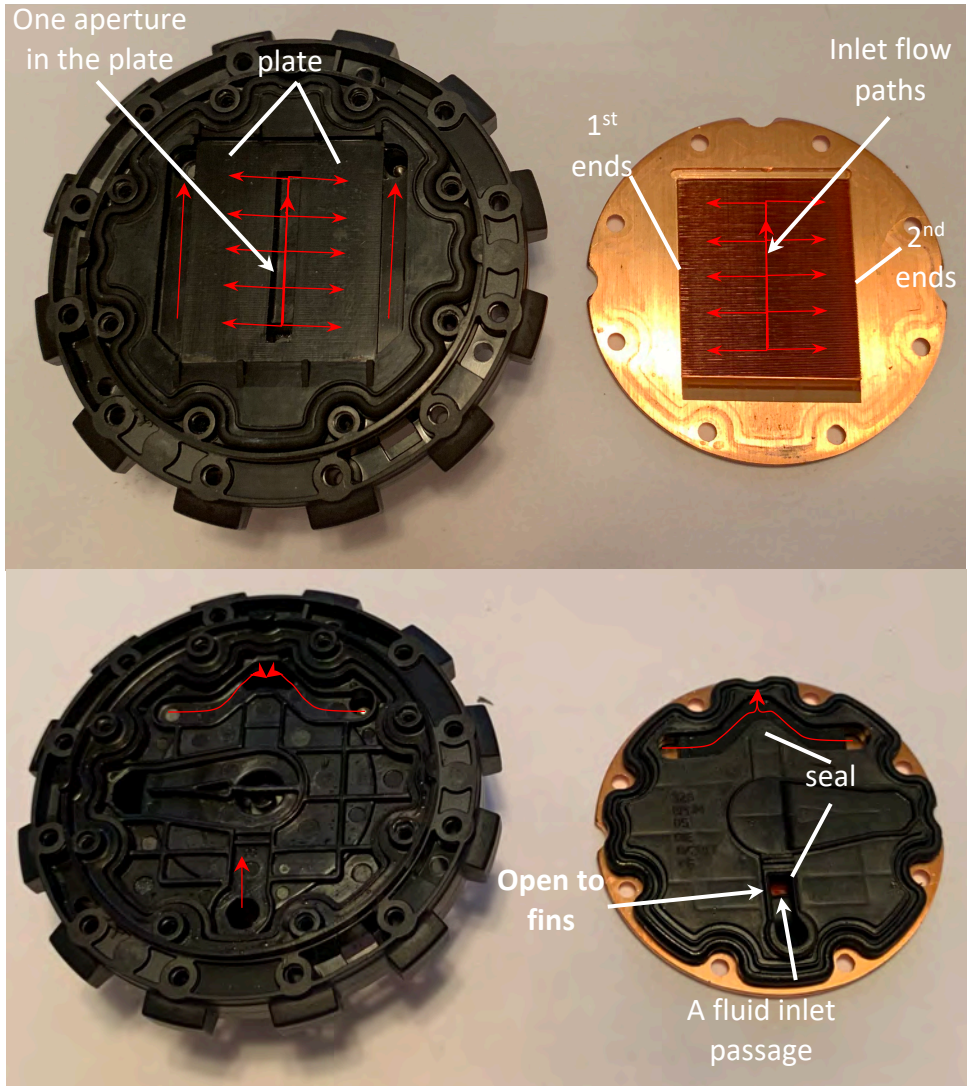
’266 Patent - Claim 13

’266 Patent Claim	Comparison to ROG Device
13[b]. a plate overlying the walls; and a seal, wherein the seal is a portion of the plate;	The top left image shows a plate that overlies the plurality of walls, whether the plurality of walls is identified as the “split-flow fins” or another selected group of fins containing more than one fin. The lower right image shows the seal as being a separately identifiable structure that is formed as a unitary construct with the plate (upper left image). Thus, the seal constitutes a portion of the plate as claimed. See, ’266, col. 12:43-44 (“Seal 230 may be installed as a portion of the plate or separately.”); FIGS. 5 and 6 (illustrating the seal 230 as being structure that is continuous and monolithic with the plate 240 and tabs 242).



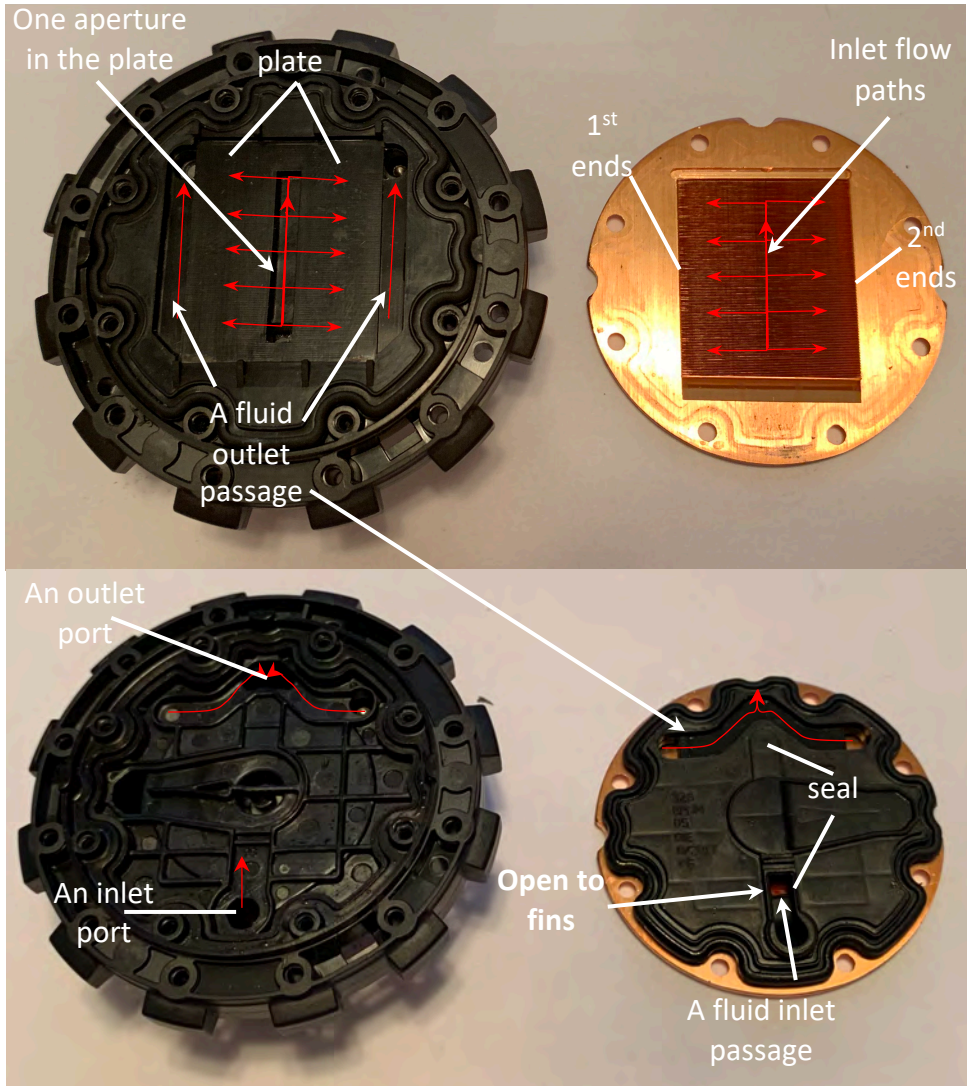
’266 Patent - Claim 13

’266 Patent Claim	Comparison to ROG Device
13[c]. a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;	The lower right and upper left images show a portion of a fluid inlet passage that delivers coolant through one aperture in the plate to each microchannel (indicated by vertical red arrow in image at upper right). The fluid inlet passage delivers the heat-exchange fluid to each microchannel at a position between the first and second end of each respective microchannel (indicated by vertical red arrow in image at upper right).



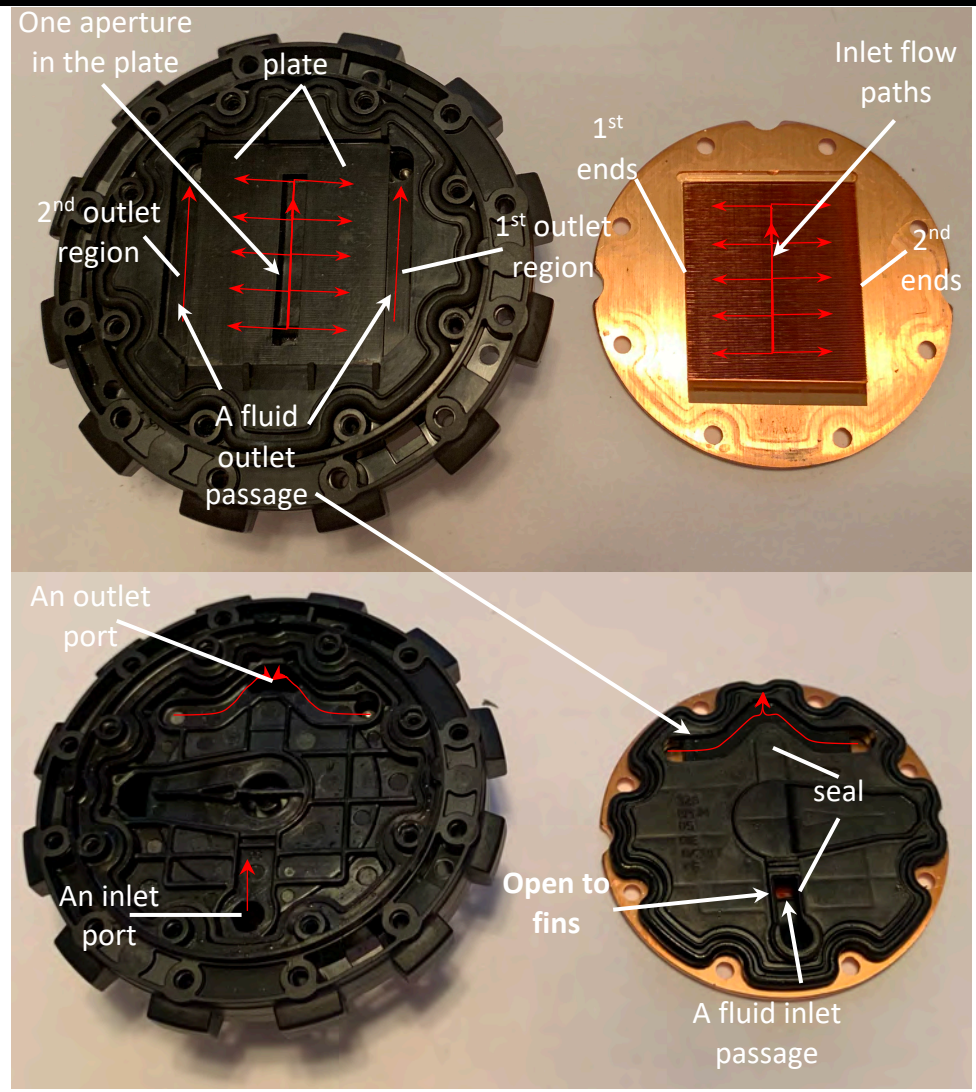
’266 Patent - Claim 13

’266 Patent Claim	Comparison to ROG Device
13[d]. a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel,	The image at upper left shows a fluid outlet passage configured to receive the heat exchange fluid from the first end and the second end of each microchannel. As the red arrows in the upper right image indicate, the coolant enters the microchannels and bifurcates into two sub flows: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage (indicated by the curved red arrows at lower left, which are superimposed on the image at lower right) receives the coolant from both ends of each microchannel and delivers the coolant to the outlet port (lower left).



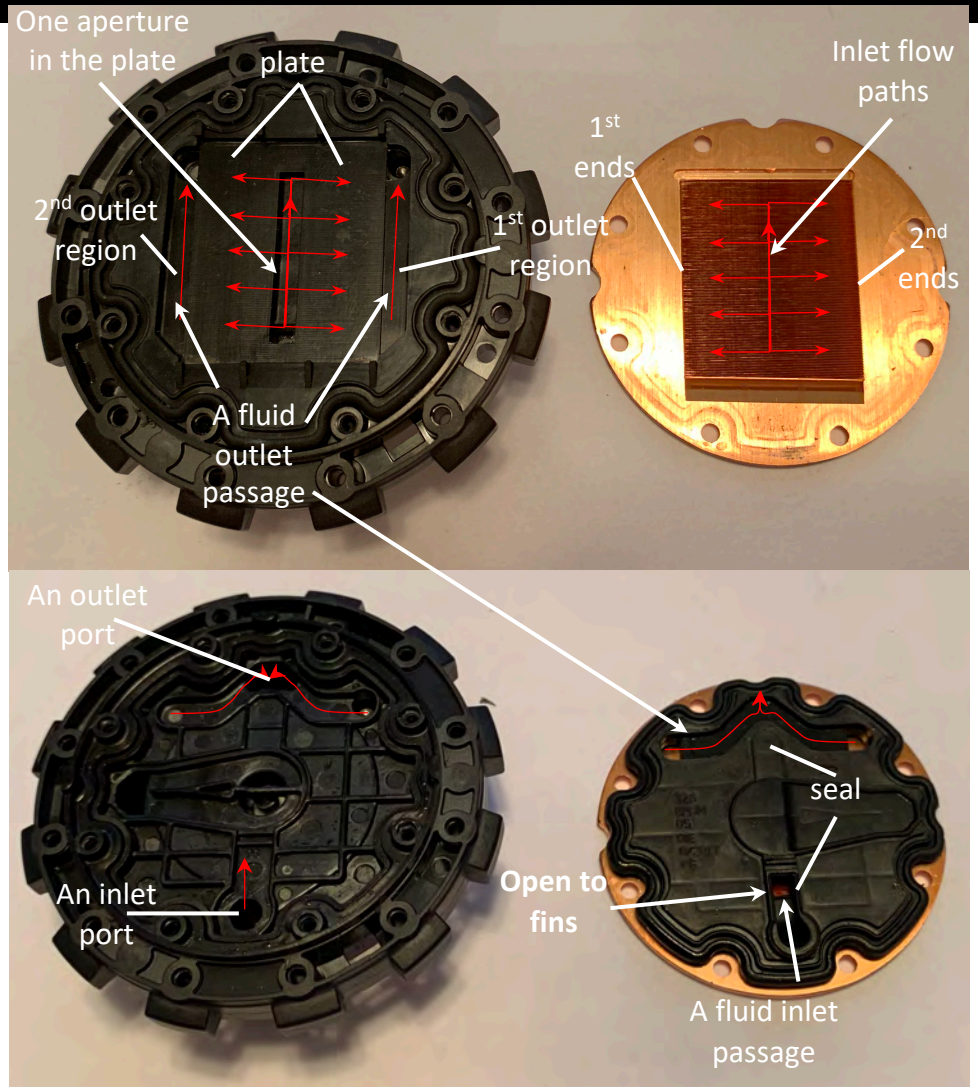
’266 Patent - Claim 13

’266 Patent Claim	Comparison to ROG Device
13[d][1]. wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends,	The upper left image shows that the fluid outlet passage has a first outlet region positioned with no intervening solid structure between it and the microchannel first ends and a second outlet region positioned with no intervening solid structure between it and the microchannel second ends.



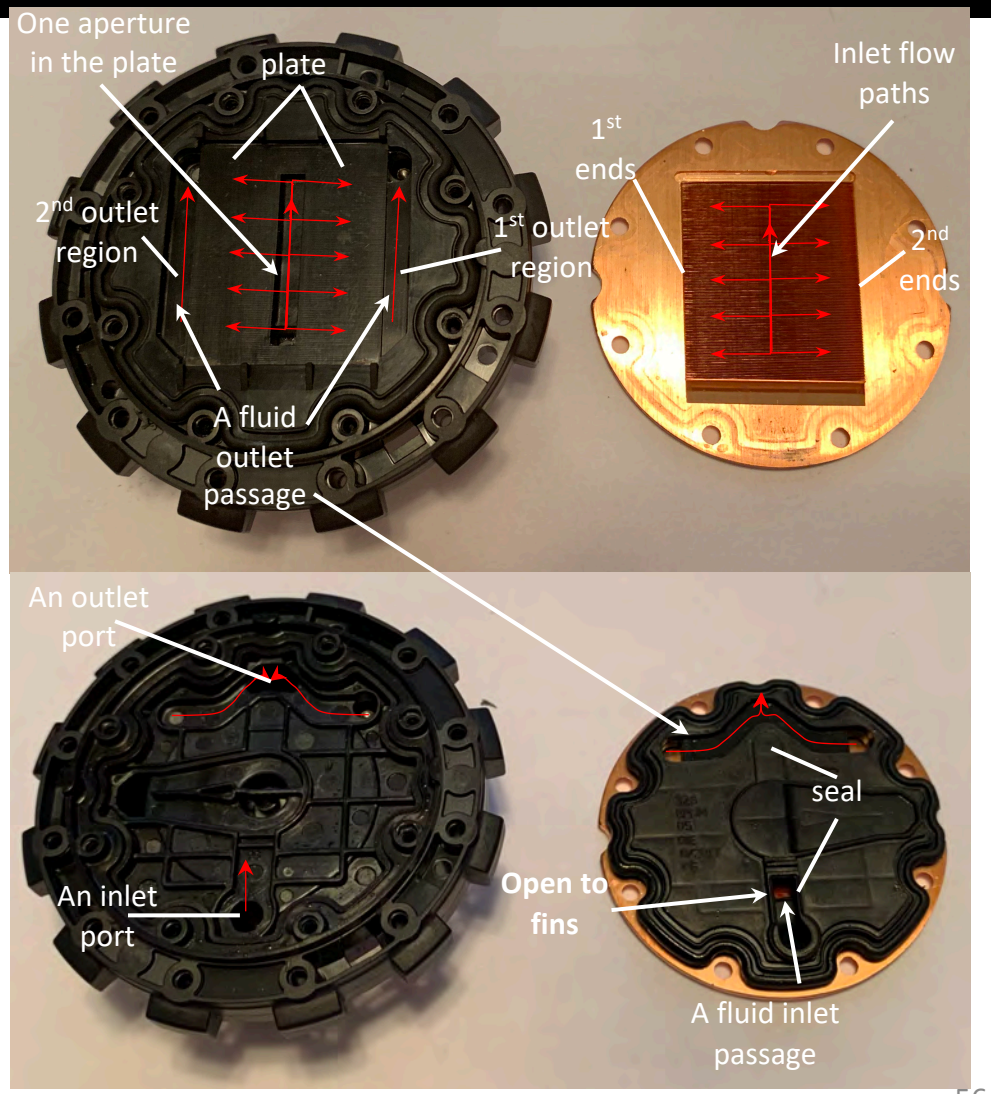
’266 Patent - Claim 13

’266 Patent Claim	Comparison to ROG Device
13[d][2]. wherein the seal separates the fluid inlet passage from the fluid outlet passage;	The image at lower right shows that the seal separates the inlet passage from the outlet passage. Because of the seal’s position and fluid-tight engagement with the housing and the plate, coolant must flow through the microchannels as indicated by the red arrows (upper right image) before reaching the outlet passage, rather than short circuiting and bypassing the microchannels by flowing directly from the inlet passage to the outlet passage.



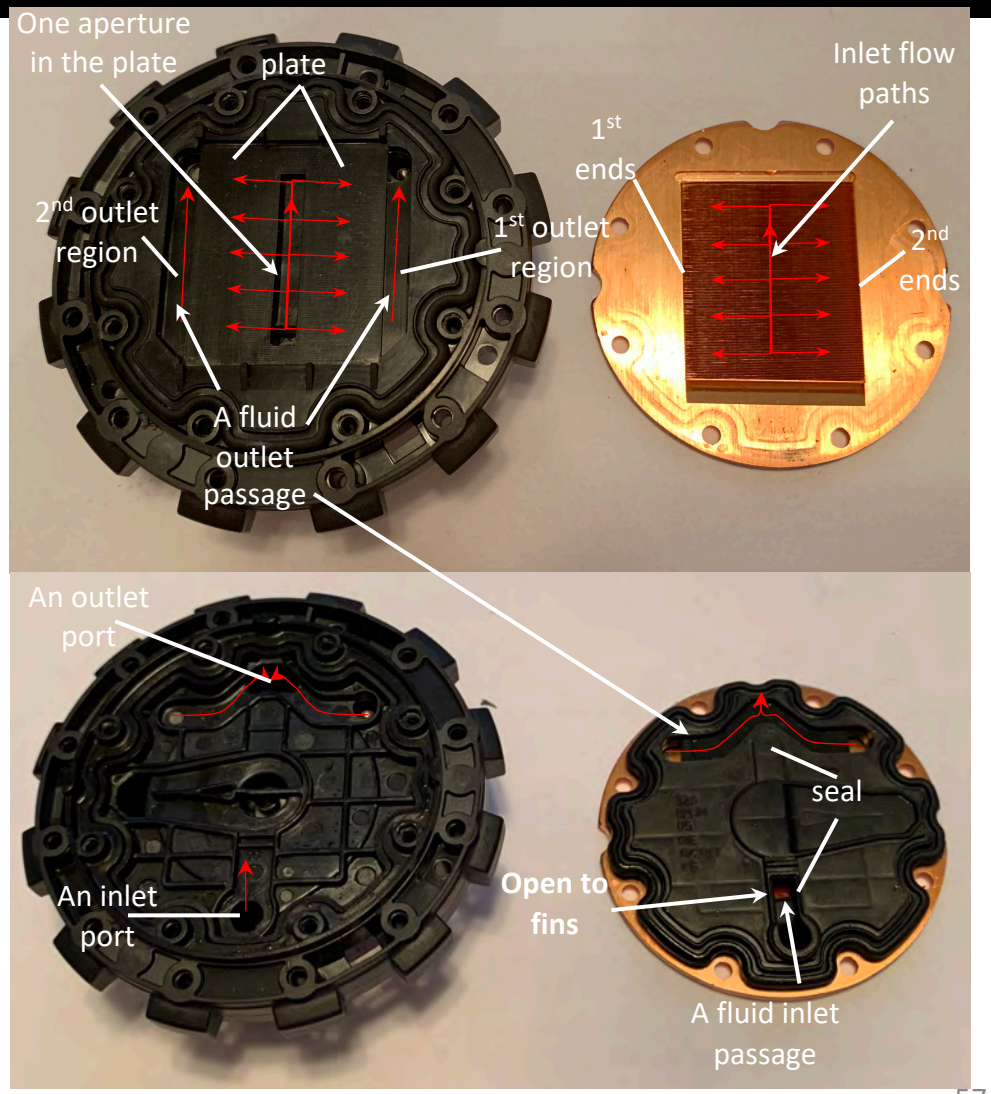
’266 Patent - Claim 13

’266 Patent Claim	Comparison to ROG Device
13[d][3]. wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel,	As the red arrows in the upper right image indicate, the coolant enters each of the selected ”plurality of microchannels” and bifurcates into two sub flows within each microchannel: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.
13[d][4]. wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends,	As indicated in the upper left image, the first outlet region receives one of the two sub flows (outwardly facing red arrows at upper left and upper right) with no intervening solid structure between it and the microchannel first ends. Similarly, as shown in the upper left image, the second outlet region receives the other of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel second ends.



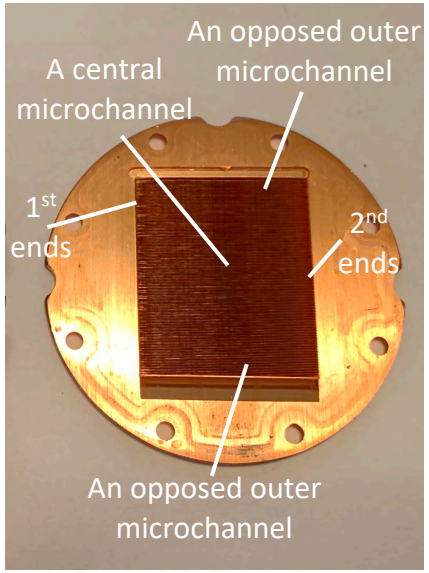
’266 Patent - Claim 13

’266 Patent Claim	Comparison to ROG Device
13[d][5]. wherein the two sub flows recombine in the outlet passage.	As indicated by the converging, curved red arrows in the lower right image, the two sub flows recombine in the outlet passage, e.g., near the outlet port, similar to a disclosed embodiment in the ’266 patent. See, e.g., ’266 patent, FIG. 2 (showing that the sub flows recombine near the outlet port 128).



’266 Patent - Claim 20

’266 Patent Claim	Comparison to ROG Device
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	As shown at right, the plurality of microchannels includes at least two outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels. As shown at far right, the first outlet region includes an outlet opening from each microchannel and the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.



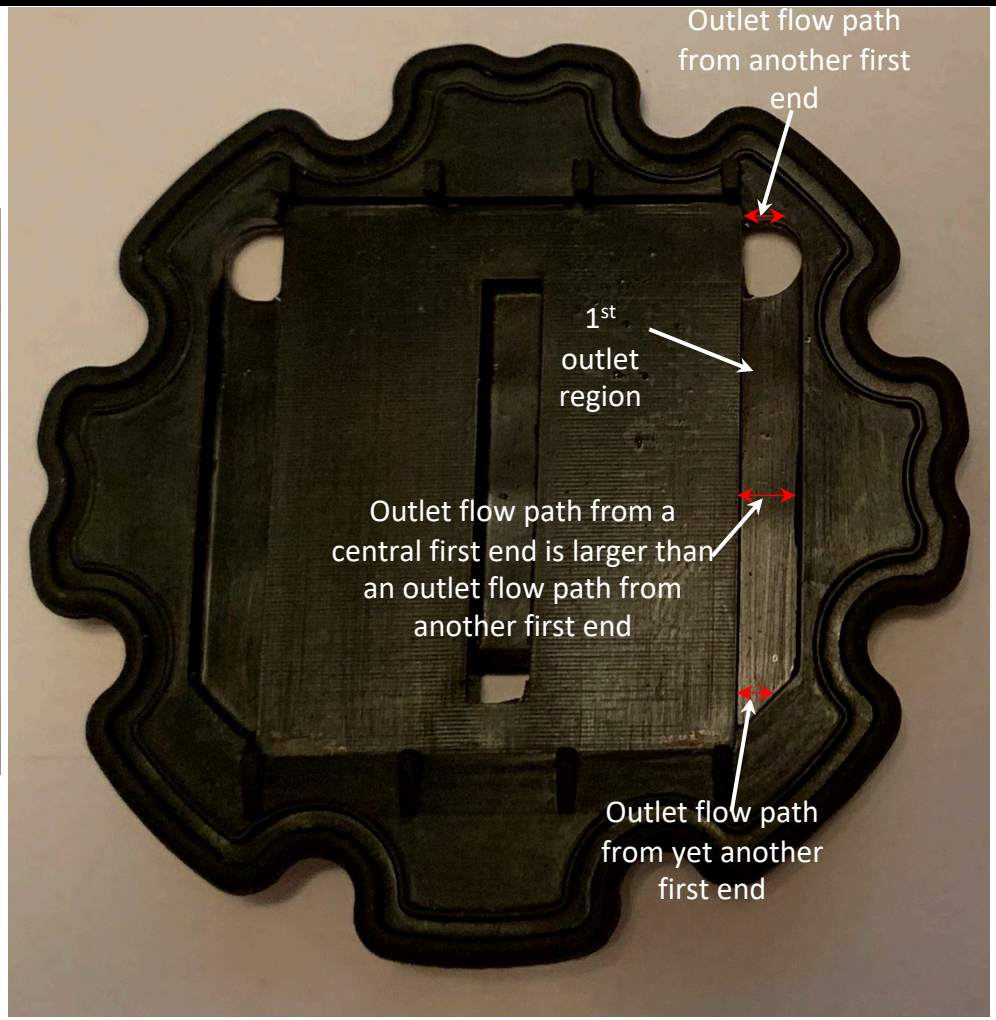
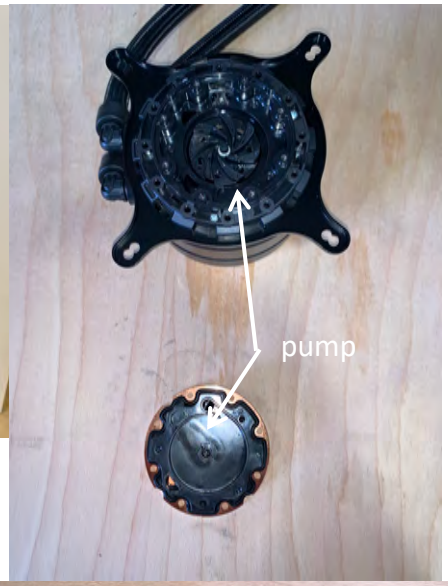


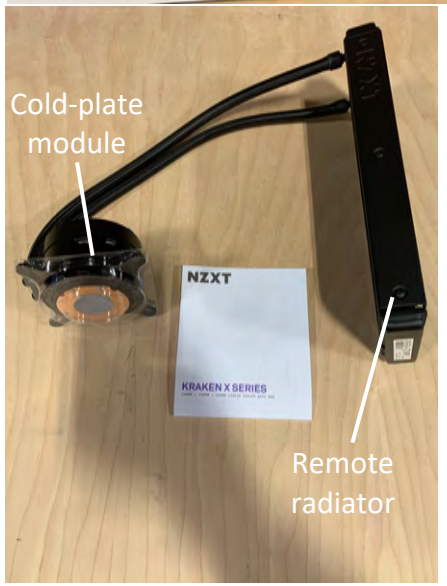
Exhibit D-4

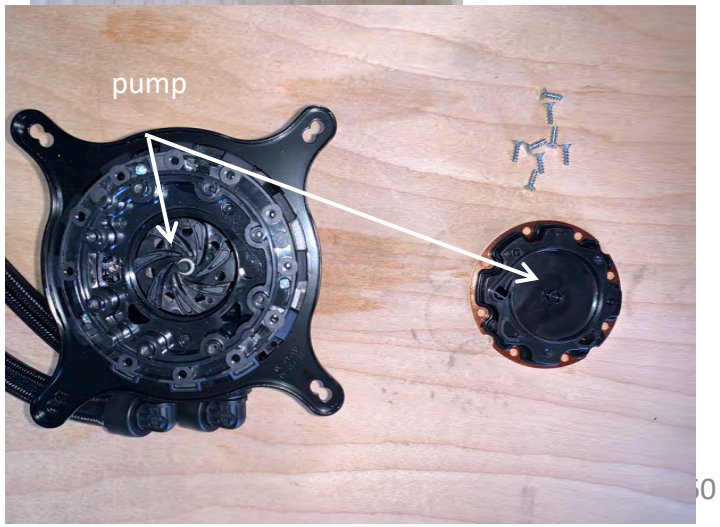
Asetek Gen 7 (represented by an NZXT X53 device)

’266 Patent - Claim 1

’266 Patent Claim	Comparison to NZXT X53
1. A heat exchange system comprising:	The KRAKEN X53 is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).

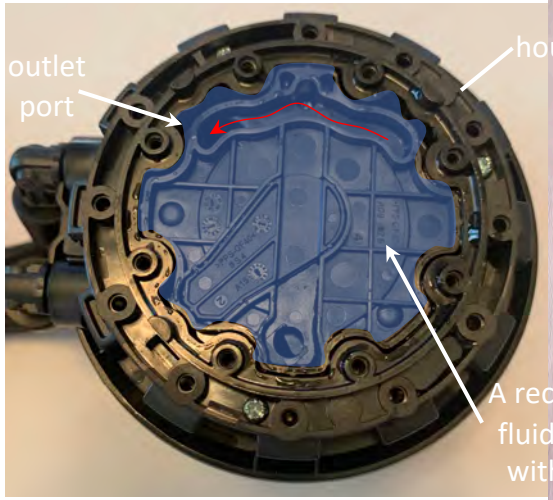


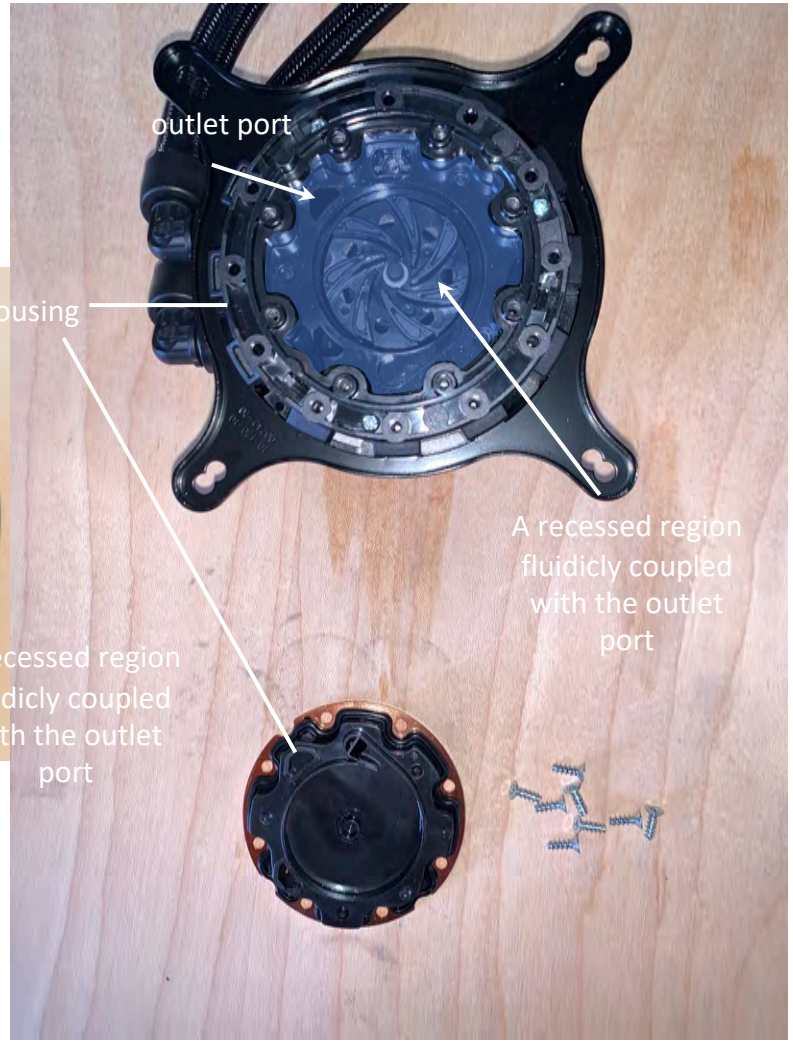




’266 Patent - Claim 1

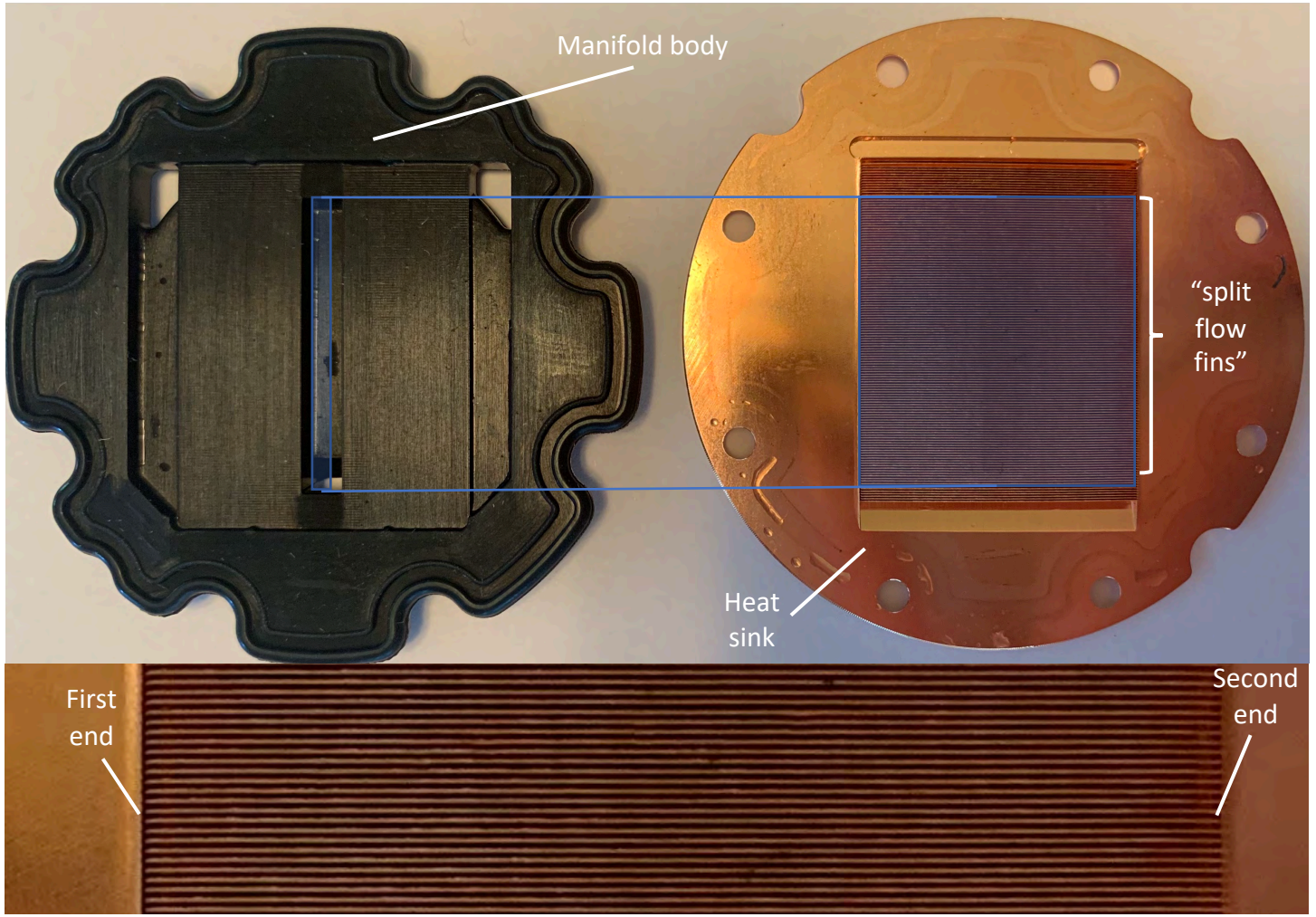
’266 Patent Claim	Comparison to NZXT X53
1[a]. a housing defining a recessed region and an outlet port fluidicly coupled with the recessed region;	The X53 device defines a recessed region and an outlet port fluidicly coupled with the recessed region. The images at left and right show the housing, together with an outlet port. The recessed region identified by the blue shading sits below and is set back from the fluted perimeter of the identified recessed region. As shown at left, the assembled housing defines such a recess. As shown at upper right (e.g., when the housing insert shown at lower right is removed), the housing defines a deeper recess (blue shaded area at upper right). The insert at lower right rests within the recess shown at upper right, leaving the recess as indicated at left. Further, at upper right, the housing defines a further recessed region in which an impeller rests. An outlet port defined by the housing (shown left and upper right) receives coolant that flows through each of the above-identified recessed regions as the coolant passes through the X53’s cold-plate module. Thus, regardless of which recessed region is selected, the outlet port is fluidicly coupled with the selected recessed region.





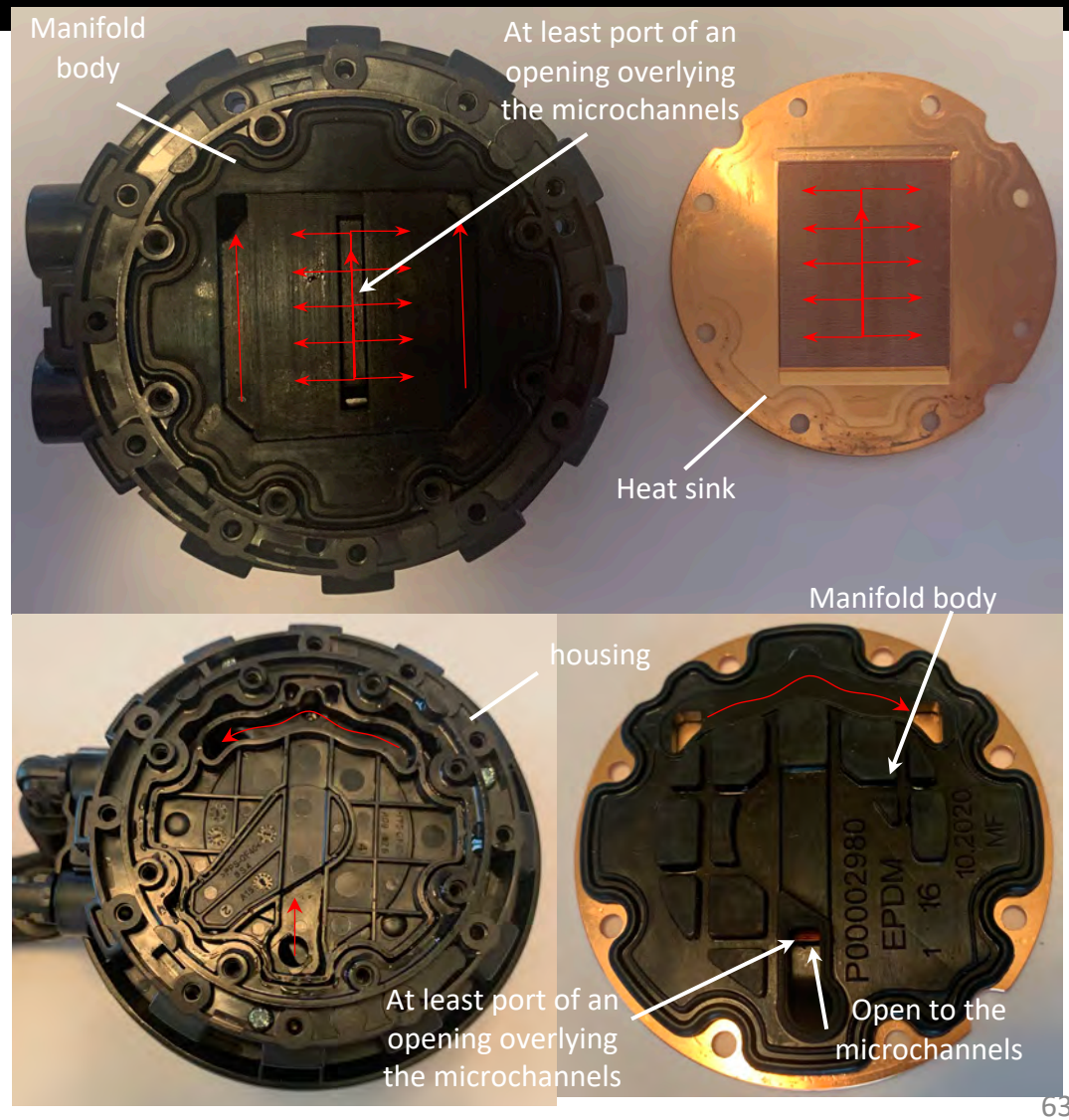
’266 Patent - Claim 1

’266 Patent Claim	Comparison to NZXT X53
1[b]. a heat sink having a plurality of juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins;	The heat sink of the X53 device literally includes more than one fin, and this group of fins is spaced apart from each other without any intervening solid structure between them. And, the spacing between the fins define a corresponding plurality of “channels with widths up to 1 millimeter.” The, the X53 satisfies the plurality of juxtaposed fins limitation. For example, the X53 device has a heat sink with a plurality of juxtaposed fins (e.g., each fin in the plurality of fins has no intervening solid structure between it and the next fin; right, shaded blue). The spacing between each pair of fins defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several spaced apart fins define a plurality of microchannels that correspond to the plurality of juxtaposed fins. As shown to the right, a group of juxtaposed fins and the corresponding plurality of microchannels are positioned beneath the opening (left, blue rectangle) in the manifold body. Each fin in this group is exposed directly to liquid flowing from the opening through the plate. These fins are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins.”



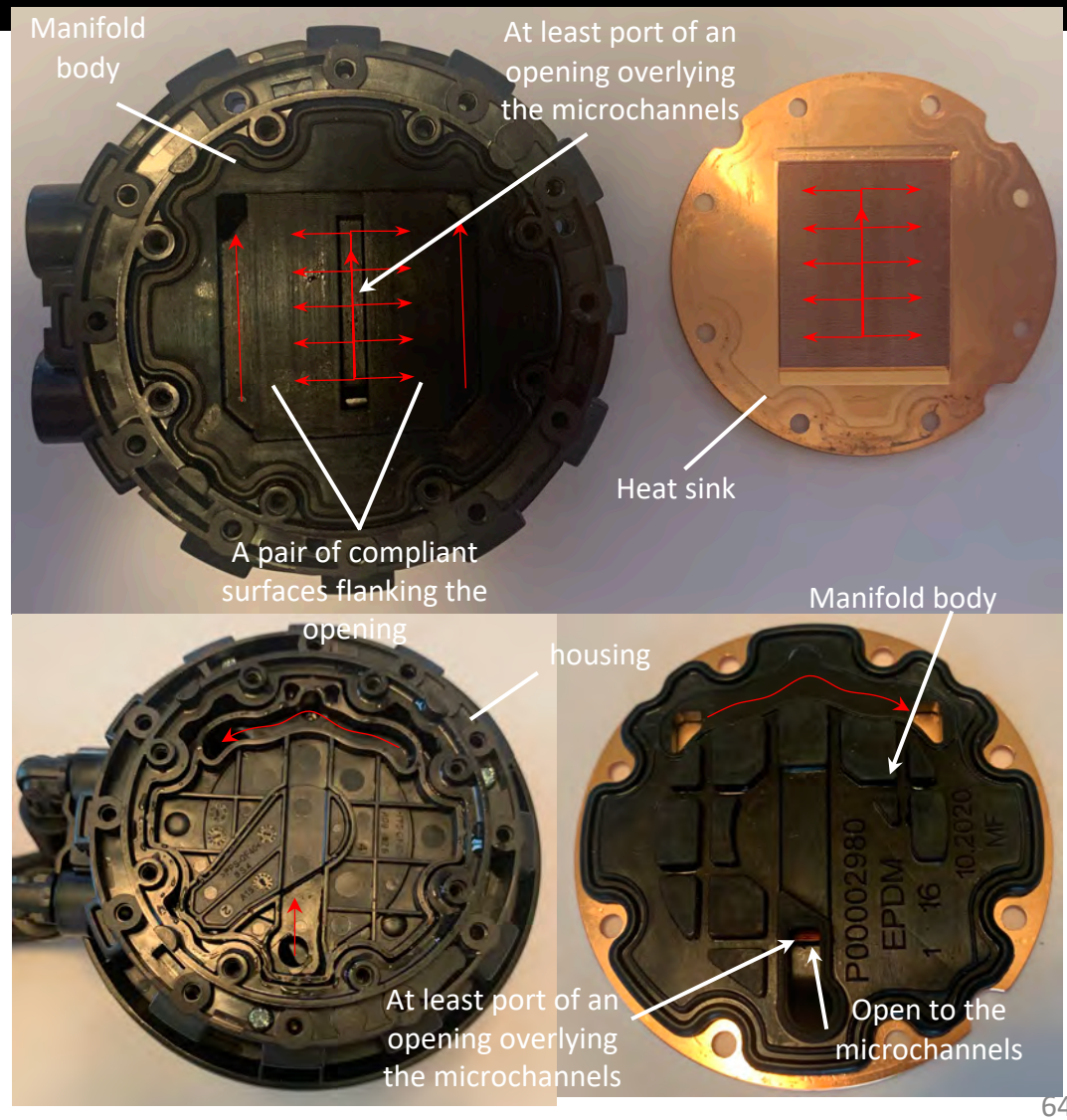
’266 Patent - Claim 1

’266 Patent Claim	Comparison to NZXT X53
1[c]. a manifold body at least partially defining an opening overlying the microchannels,	As shown at upper left, the X53 device includes a manifold body. As shown at lower right, the manifold body overlies the microchannels, regardless of which definition of “plurality of fins” is used. As shown at upper left, the manifold body defines at least part of an opening positioned over the microchannels. This is shown at lower right (note that the fins defining the microchannels are visible through the manifold body).



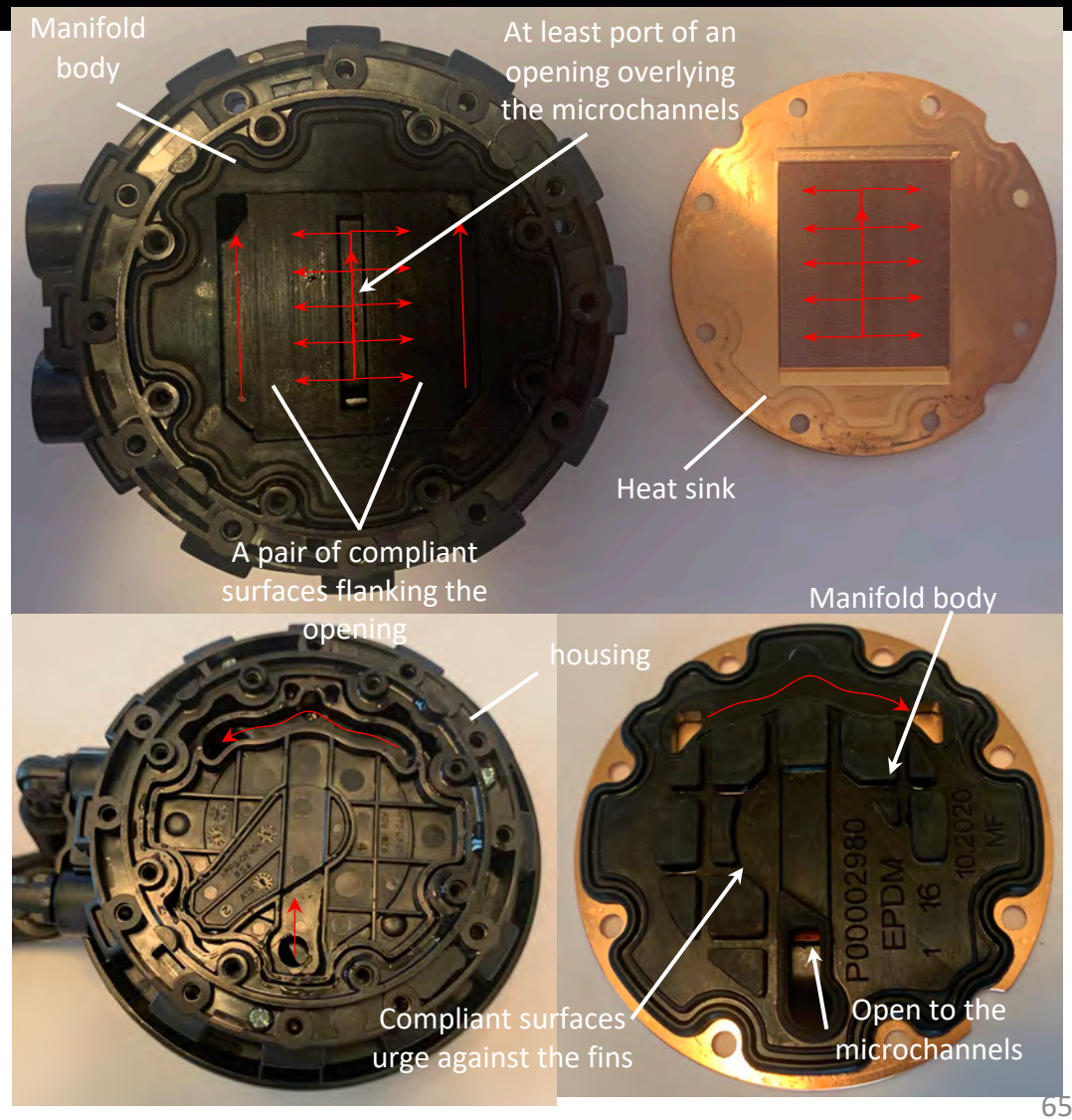
’266 Patent - Claim 1

’266 Patent Claim	Comparison to NZXT X53
1[d]. wherein the manifold body defines a pair of compliant surfaces flanking the opening,	At upper left, the X53’s device’s pair of compliant surfaces made of a compliant polymer (e.g., rubber) are shown flanking the opening.



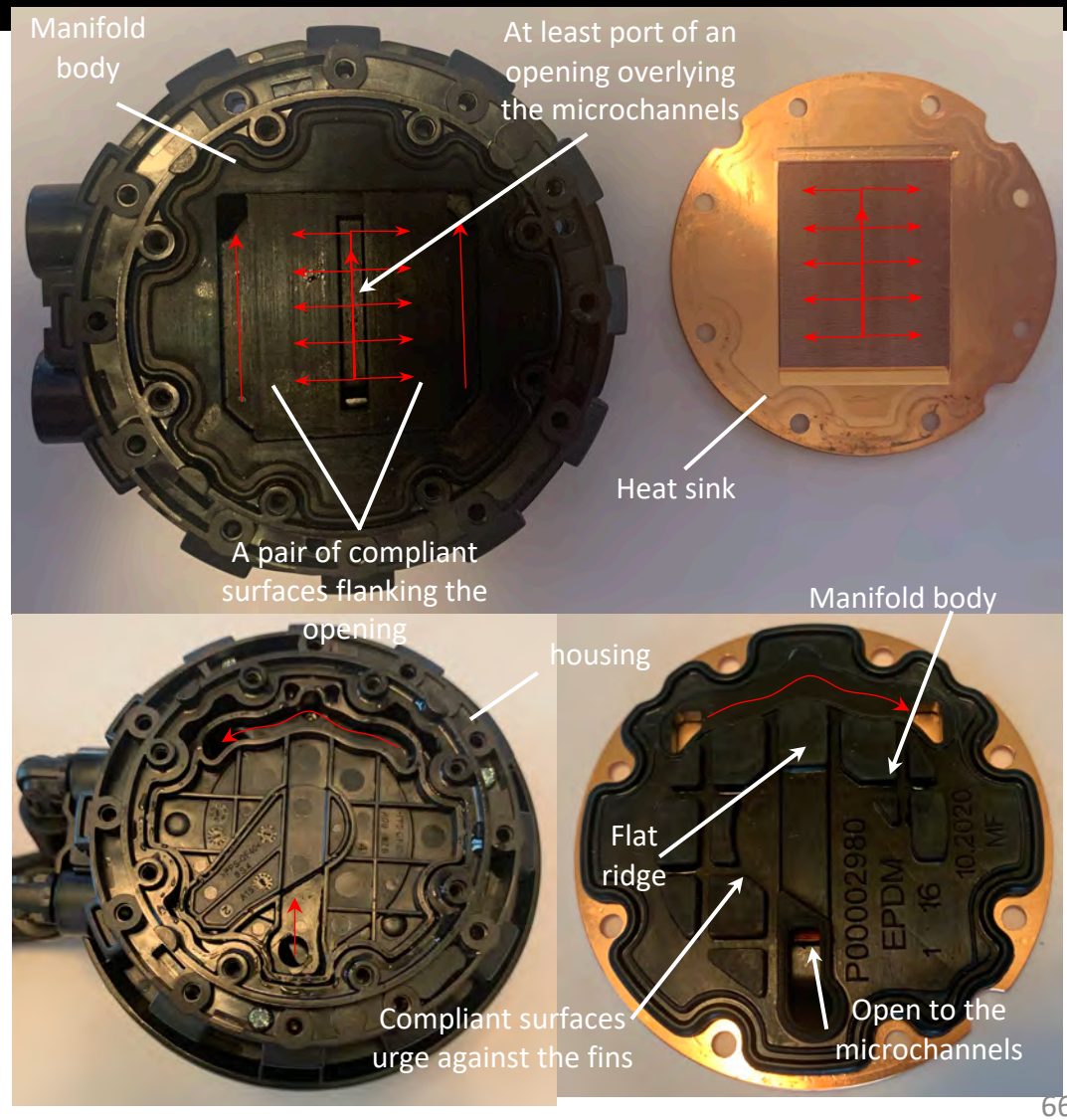
’266 Patent - Claim 1

’266 Patent Claim	Comparison to NZXT X53
1[e]. wherein the compliant surfaces urge against the fins, defining a flow boundary of the microchannels,	When assembled as shown immediately below, the X53’s cold-plate module compresses the manifold body (top left and lower right) between the heat sink and the housing, which urges the compliant surfaces against the fins and defines a flow boundary of the microchannels. The flow boundary inhibits coolant from leaking out of the microchannels, which would otherwise deteriorate cooling performance.



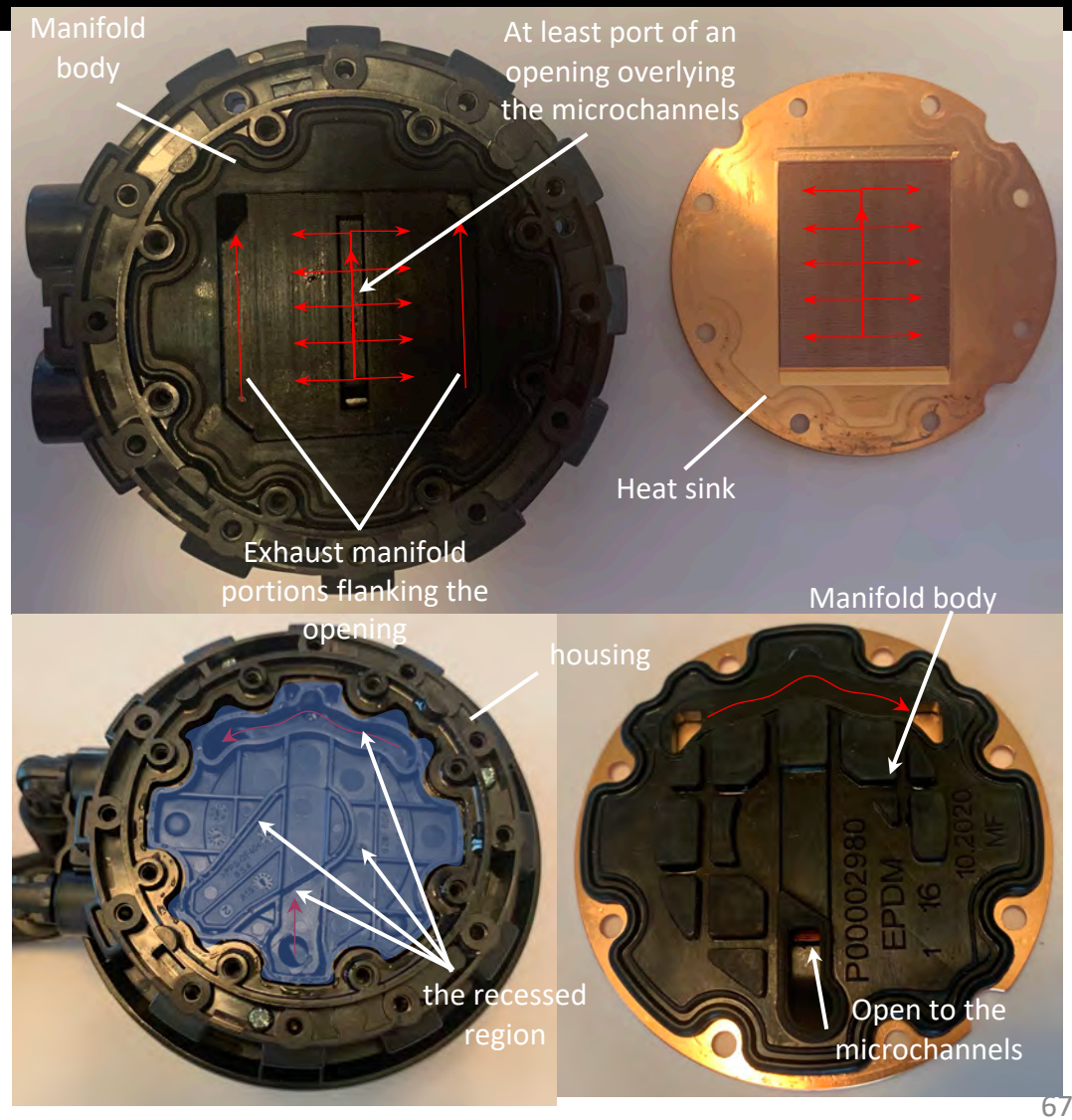
’266 Patent - Claim 1

’266 Patent Claim	Comparison to NZXT X53
1[f]. wherein the opening extends transversely relative to the fins and is configured to distribute a working fluid among the microchannels,	As the upper left image shows, the opening extends transversely (e.g., across the tops of) the fins. The upwardly directed red arrow (center) shown at upper left lies within the opening (e.g., as a longitudinal axis of the opening) and is superimposed over the fins in the upper right image to indicate a flow of a working fluid being distributed among the microchannels. Further, the fins in the image at lower right are oriented as shown in the image at the upper right (note fins are visible below center in the lower right image). The lower right image clearly shows that the longitudinal axis of the opening extends transversely to the fins. Still further, the flat ridge shown in the lower right image corresponds to a portion of the opening that overlies the fins, further demonstrating that the opening extends transversely overtop the fins, which distributes a working fluid among the microchannels as the fluid passes through the opening into the microchannels during operation.



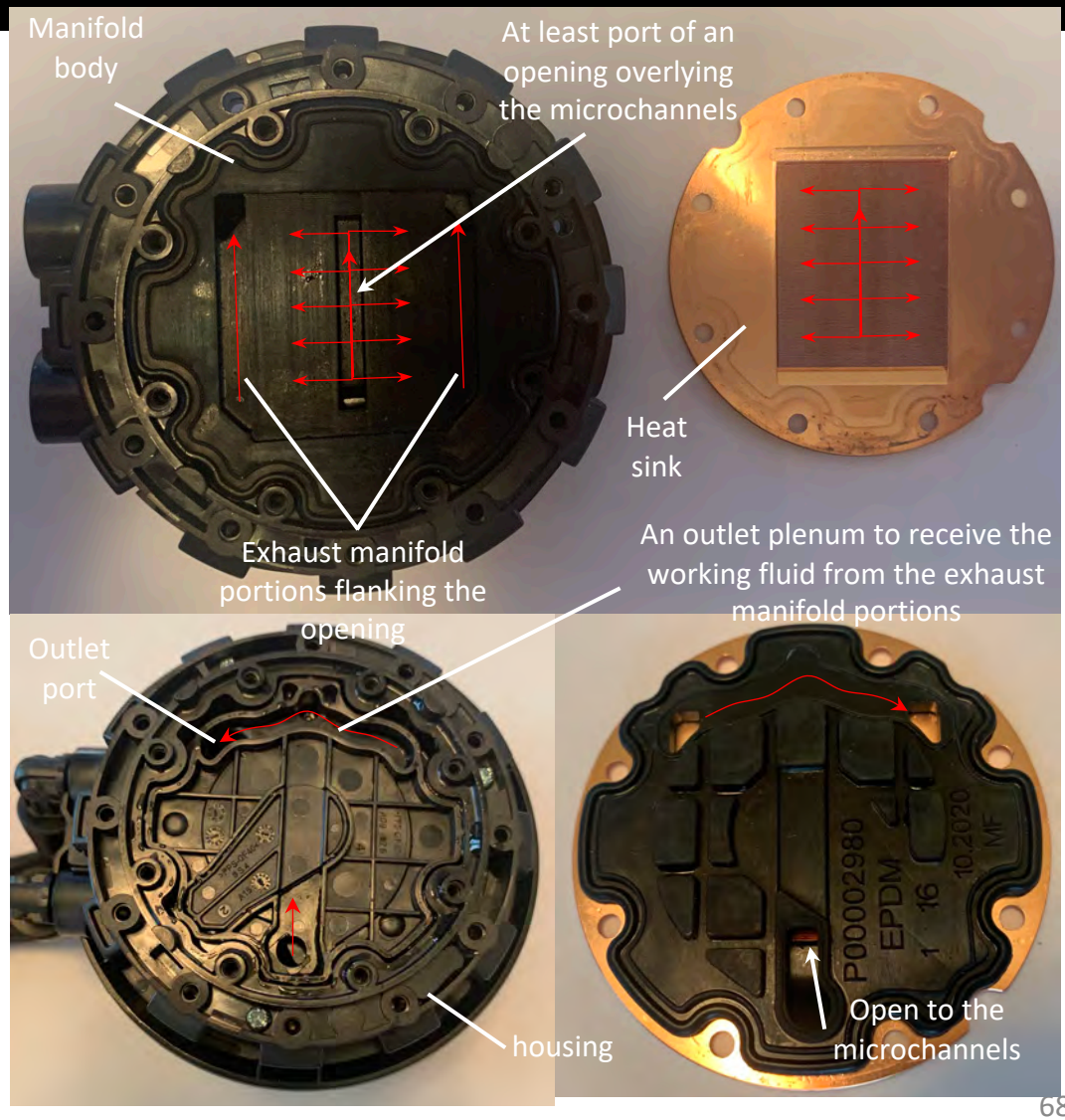
’266 Patent - Claim 1

’266 Patent Claim	Comparison to NZXT X53
1[g]. wherein the manifold body partially occupies the recessed region of the housing, leaving a pair of opposed portions of the recessed region unfilled, defining opposed exhaust manifold portions flanking the opening and being configured to receive the working fluid from the microchannels, and	The upper left image shows the manifold body positioned within and thus partially occupying the recessed region of the housing (e.g., shown at lower left), regardless of which recessed region defined by the housing is selected. In leaving a pair of opposed portions of the selected recessed region unfilled, the manifold body defines opposed exhaust manifold portions flanking the opening, as shown at upper left. The outwardly directed red arrows shown at upper right indicate a flow of the working fluid through the microchannels. The outwardly directed red arrows are superimposed on the image at upper right, showing that the outwardly directed flows of the working fluid through the microchannels enter the opposed exhaust manifold portions. Thus, the opposed exhaust manifold portions flanking the opening are configured to receive the working fluid from the microchannels, as claimed.



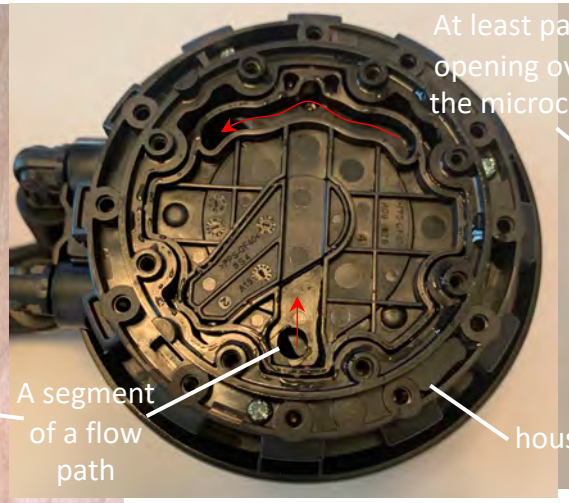
’266 Patent - Claim 1

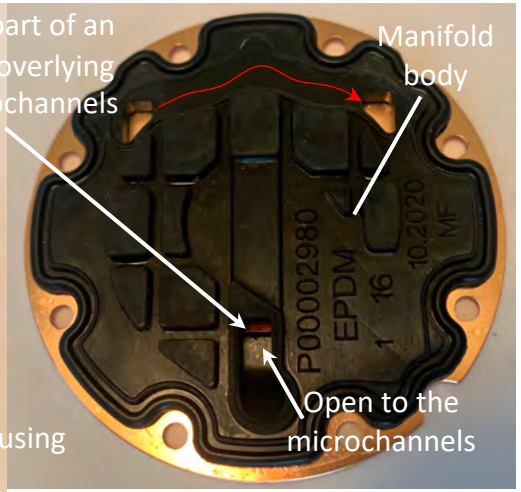
’266 Patent Claim	Comparison to NZXT X53
1[h]. wherein the housing further defines an outlet plenum configured to receive the working fluid from the exhaust manifold portions and to convey the working fluid to the outlet port.	The image at lower left shows an outlet plenum that receives the working fluid from the exhaust manifold portions. The outlet plenum conveys the working fluid to the outlet port.



’266 Patent - Claim 2

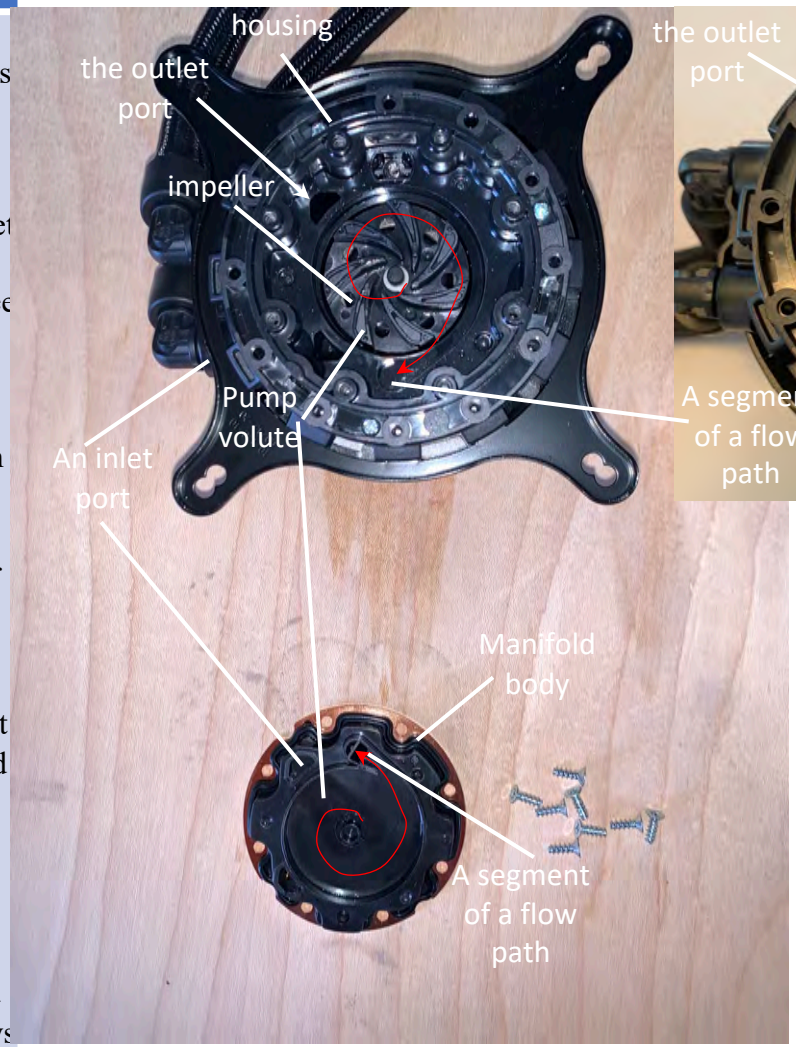
’266 Patent Claim	Comparison to NZXT X53
2. The heat exchange system according to claim 1, wherein the housing defines a pump volute and a segment of a flow path, the segment configured to convey the working fluid from the pump volute to the opening at least partially defined by the manifold body, the heat exchange system further comprising an impeller positioned in the pump volute and configured to urge the working fluid along the flow path.	The top-center image shows the housing. In the top left image, a piece of the housing has been removed. (The lower left image shows the removed piece.) The top and bottom left images show the pump volute defined by the housing. As well, the housing defines a segment of a flow path configured to convey the working fluid from the pump volute to the opening defined in part by the manifold body. For example, the outwardly spiraling red arrows (top and bottom left) indicate a swirling flow of the working fluid as it passes through and out of the pump volute along the segment. The vertical red arrow in the top-center image depicts a flow of the working fluid from the flow path segment that passes into the opening (shown at upper right) overlying the microchannels.

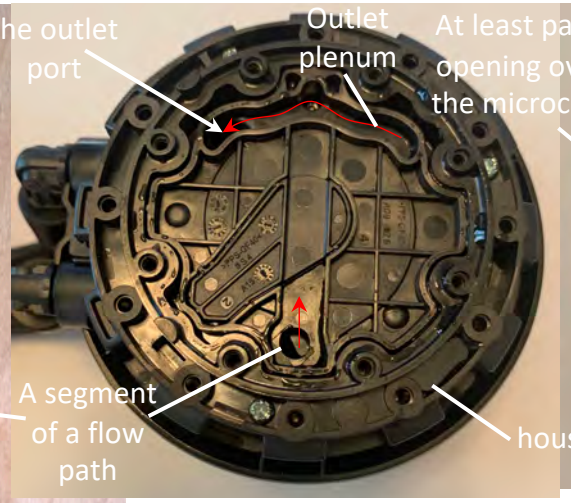


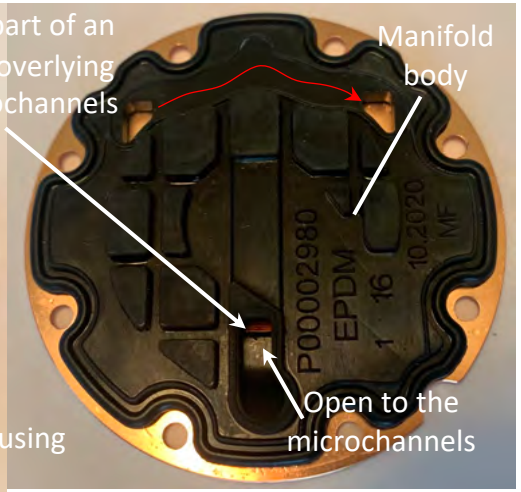


’266 Patent - Claim 5

’266 Patent Claim	Comparison to NZXT X53
5. The heat exchange system according to claim 2, wherein the housing defines an inlet port, wherein the flow path extends from the inlet port to the outlet port and is configured to convey the working fluid from the inlet port through the pump volute, the manifold body, the microchannels, the opposed exhaust manifold portions, and the outlet plenum to the outlet port.	The upper left image shows an inlet port and the outlet port. The red arrows indicate the path that the working fluid follows through the cold-plate module of the X53 device. As indicated at upper left, the fluid enters from the inlet port and flows through a channel into an entrance to the pump volute (also see lower left). On entering the pump volute (upper left; lower left), the spinning impeller (upper left) imparts momentum to the working fluid, which exits the pump volute along the indicated segment of the flow path (spiraling red arrow at upper and lower left; vertical red arrow below center of middle image), passing through the manifold body (upper right image) and entering the microchannels (upper right image). The opposed exhaust manifold portions (not shown on this slide, shown previously; flow path indicated by straight red arrows) collect the working fluid from the microchannels and the working fluid follows the flow path into the outlet plenum (curved red arrows in upper middle), which conveys the working fluid to the outlet port (upper left).

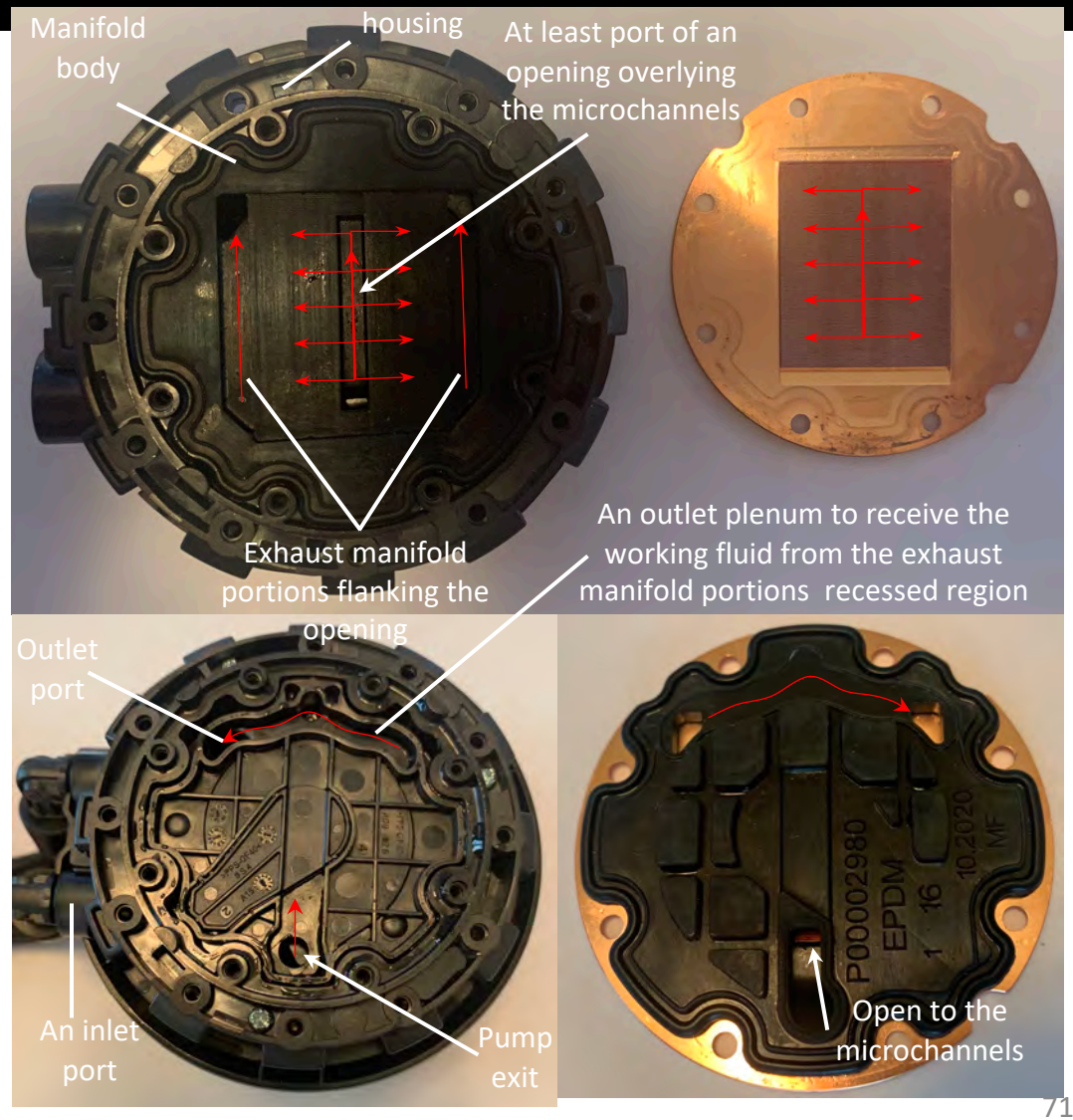






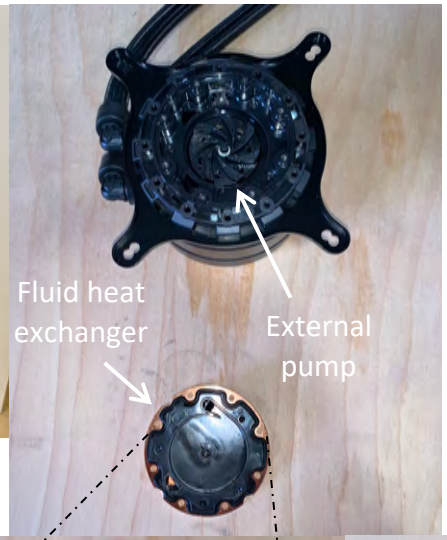
’266 Patent - Claim 9

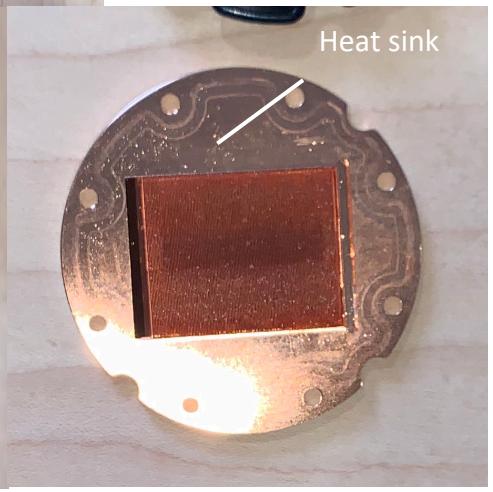
’266 Patent Claim	Comparison to NZXT X53
9. The heat-exchange module according to claim 1, wherein a flow of the working fluid defines a flow path, wherein the flow path is distributed among the plurality of microchannels, and, within each microchannel, the flow path bifurcates into a pair of opposed sub-flow paths directed away from each other.	Coolant flow through the X53 device defines a flow path. Red arrows superimposed on the images at right indicate the flow path. After exiting the pump (below center of lower left image), the coolant passes into the opening overlying the microchannels (indicated by central, upwardly directed red arrow at upper left). As the coolant flows over top the microchannels, the coolant flow (and thus the path the flow defines) is distributed among the plurality of microchannels, as indicated by the upwardly directed red arrow superimposed on the upper right image. The coolant flow enters each of the microchannels and, within each microchannel, splits (or bifurcates) into outwardly directed sub-flows (indicated by the outwardly directed red arrows superimposed on the upper right image). Thus, the coolant flow defines a flow path that bifurcates within each microchannel into a pair of opposed sub-flow paths directed away from each other, as claim 9 recites



’266 Patent - Claim 13

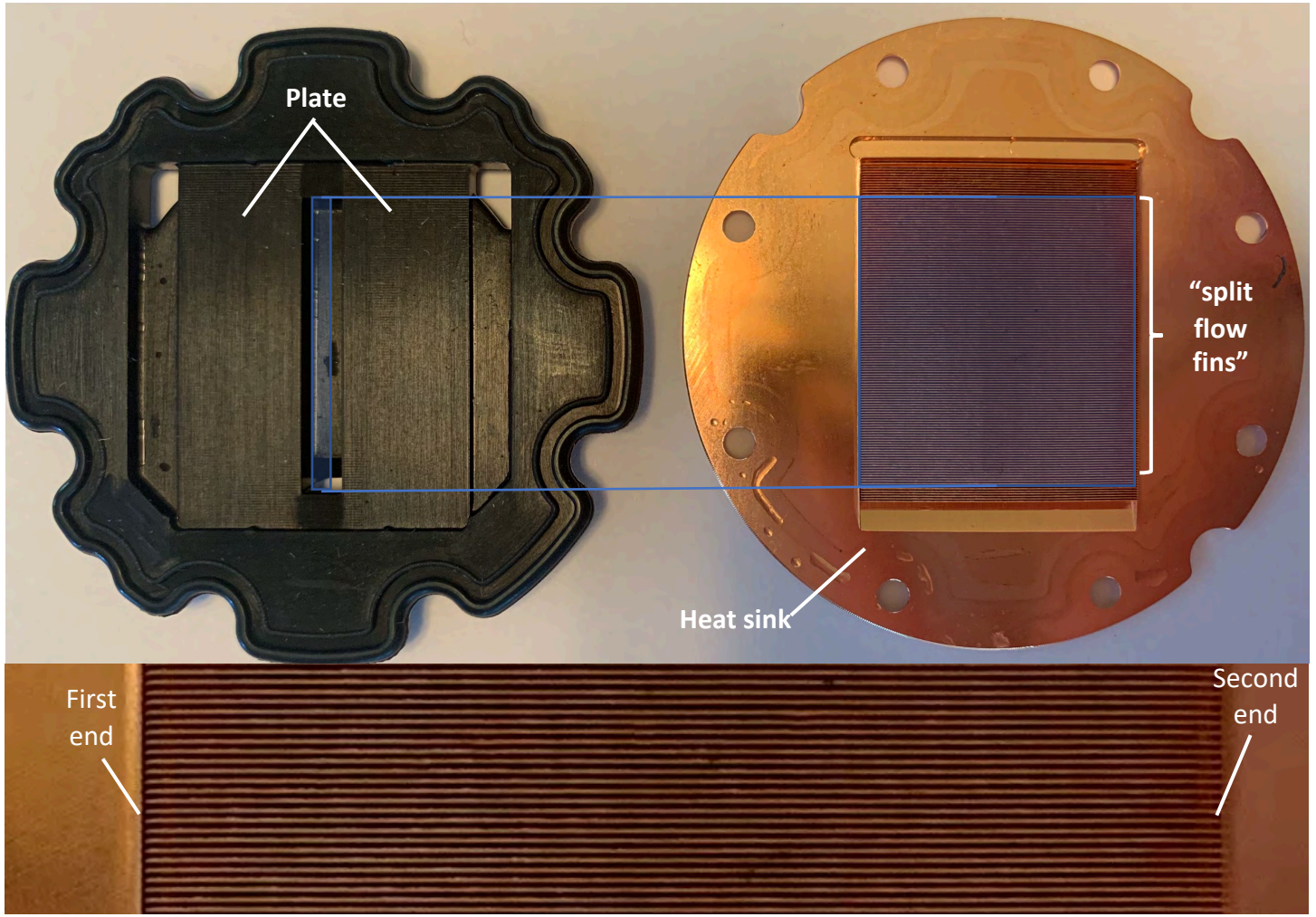
’266 Patent Claim	Comparison to NZXT X53
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The X53 device includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the X53 device has a copper heat spreader plate and a housing separable from the pump. Thus, the X53 device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component." As shown to the right, the pump is external to the component that transfers heat from a heat source to a cooling liquid. The plastic housing can be sectioned parallel to the copper plate to define a pump external to the component (e.g., below the plane of the section).





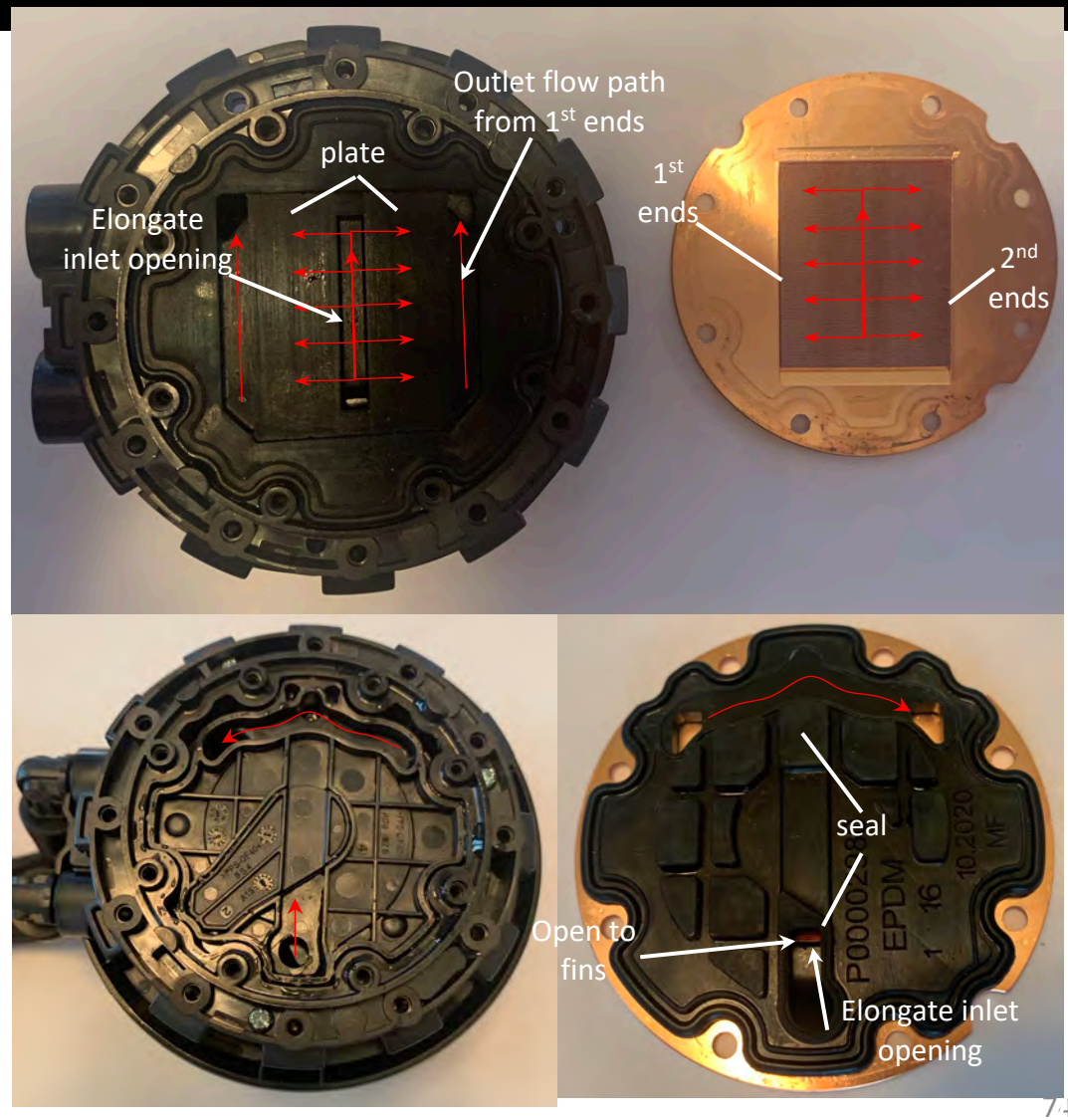
’266 Patent - Claim 13

’266 Patent Claim	Comparison to NZXT X53
13[a]. a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;	The X53 device literally includes more than one wall, and this group of walls is spaced apart from each other, defining channels. And, the spacing between the walls define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the X53 satisfies the plurality of walls limitation. For example, the X53 device has several spaced-apart walls (e.g., right, shaded blue). The spacing between each pair of walls defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several walls define a plurality of microchannels that correspond to the walls. As shown to the right, a group of walls and microchannels are positioned beneath the opening (left) in the plate. Each wall in this group is exposed directly to liquid flowing from the opening through the plate. These walls are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “plurality of walls.” As shown in the bottom photograph (detail view of upper right photograph), each microchannel extends from a first end to a second end.



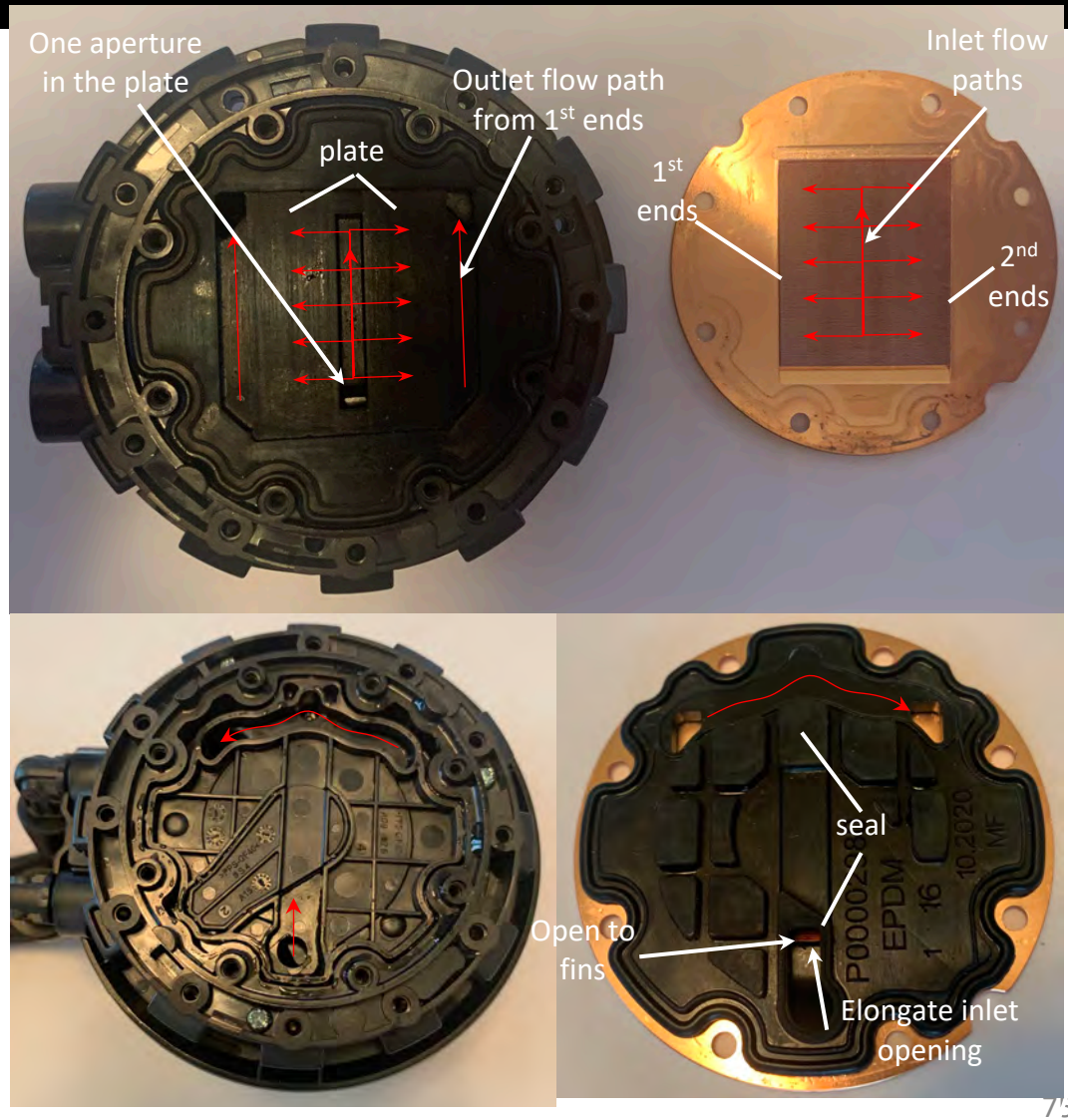
’266 Patent - Claim 13

’266 Patent Claim	Comparison to NZXT X53
13[b]. a plate overlying the walls; and a seal, wherein the seal is a portion of the plate;	The top left image shows a plate that overlies the plurality of walls, whether the plurality of walls is identified as the “split-flow fins” or another selected group of fins containing more than one fin. The lower right image shows the seal as being a separately identifiable structure that is formed as a unitary construct with the plate (upper left image). Thus, the seal constitutes a portion of the plate as claimed. See, ’266, col. 12:43-44 (“Seal 230 may be installed as a portion of the plate or separately.”); FIGS. 5 and 6 (illustrating the seal 230 as being structure that is continuous and monolithic with the plate 240 and tabs 242).



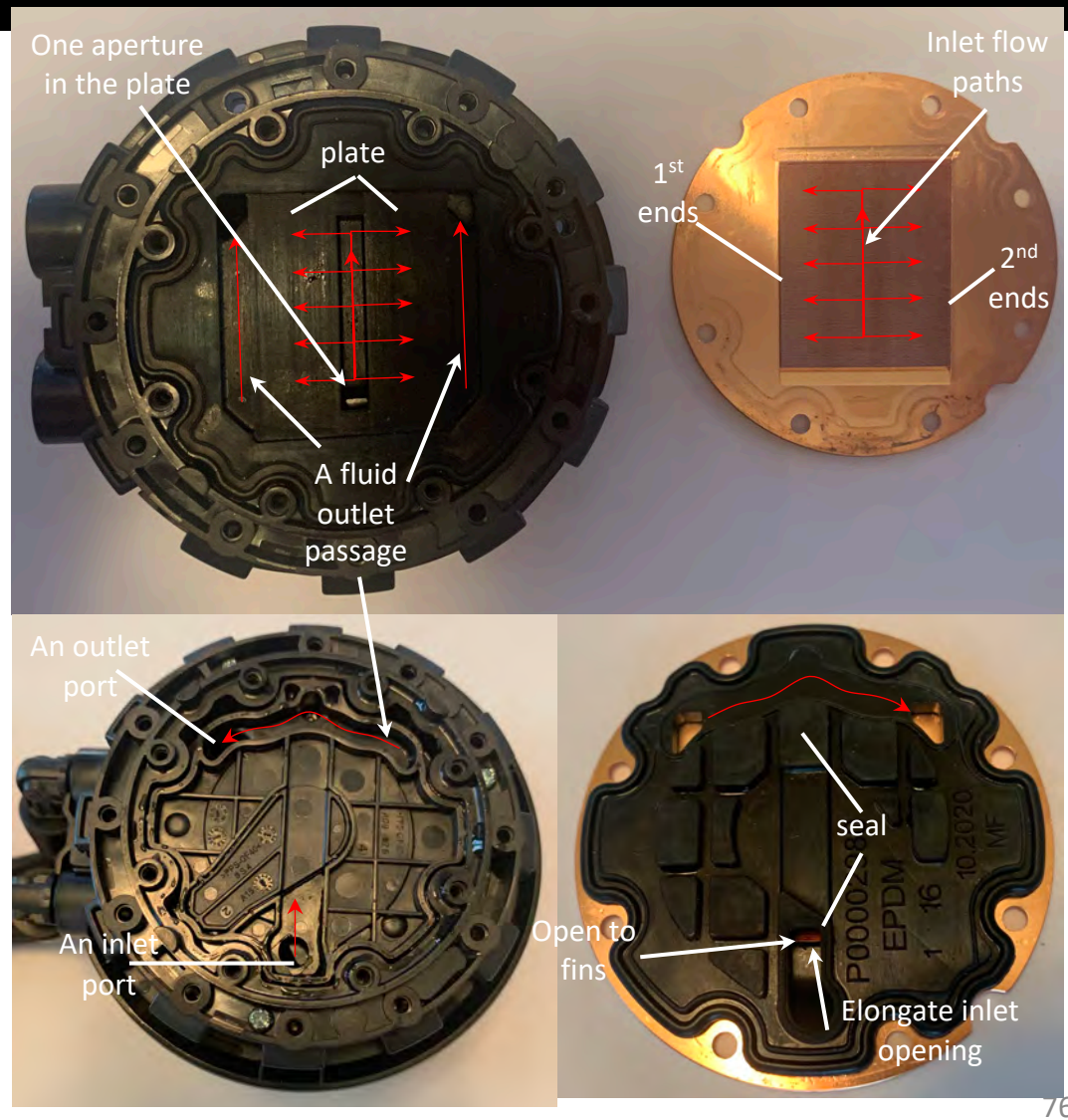
’266 Patent - Claim 13

’266 Patent Claim	Comparison to NZXT X53
13[c]. a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;	The lower right and upper left images show a portion of a fluid inlet passage that delivers coolant through one aperture in the plate to each microchannel (indicated by vertical red arrow in image at upper right). The fluid inlet passage delivers the heat-exchange fluid to each microchannel at a position between the first and second end of each respective microchannel (indicated by vertical red arrow in image at upper right).



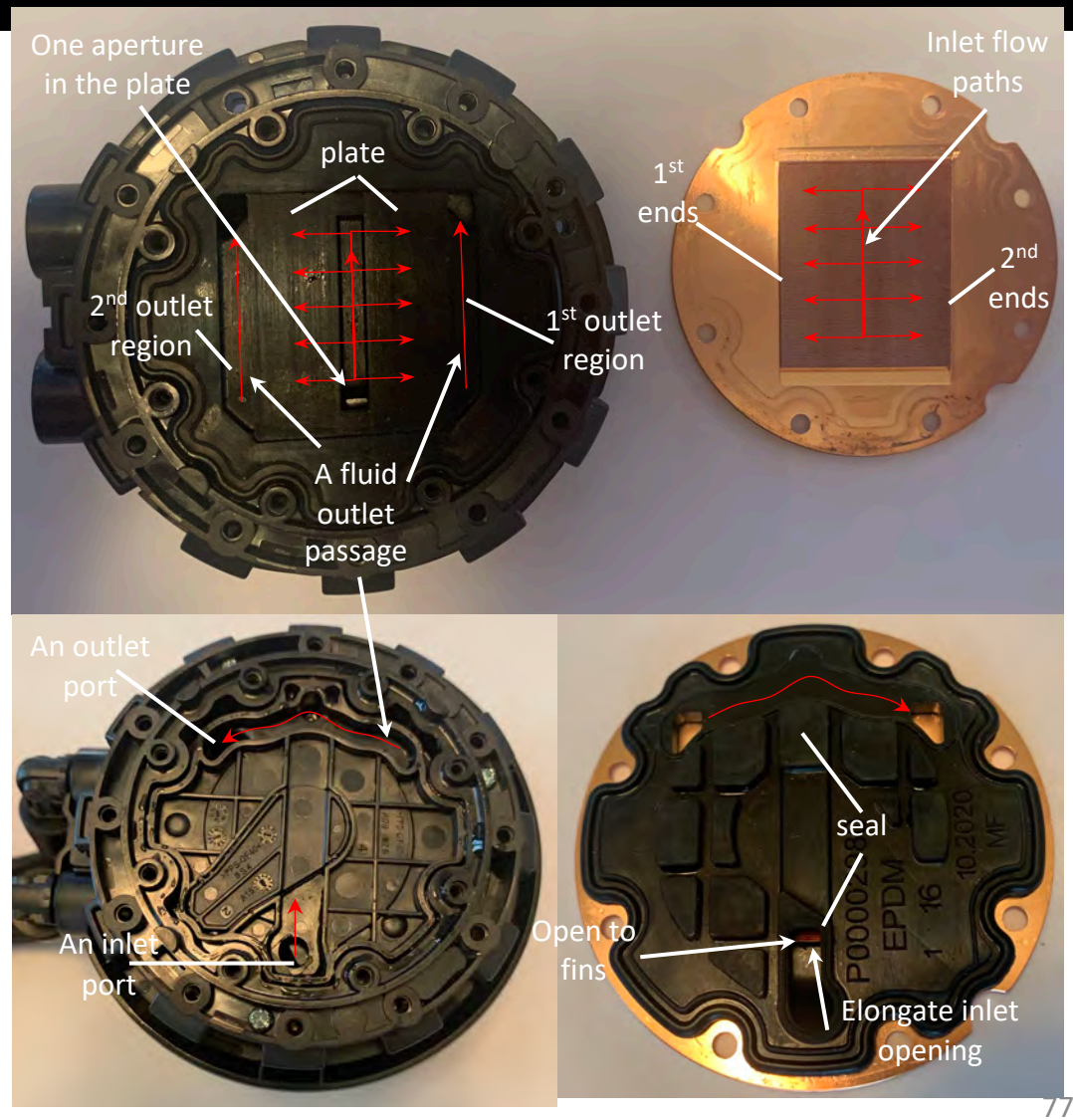
’266 Patent - Claim 13

’266 Patent Claim	Comparison to NZXT X53
13[d]. a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel,	The image at upper left shows a fluid outlet passage configured to receive the heat exchange fluid from the first end and the second end of each microchannel. As the red arrows in the upper right image indicate, the coolant enters the microchannels and bifurcates into two sub flows: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage (indicated by the curved red arrows at lower left, which are superimposed on the image at lower right) receives the coolant from both ends of each microchannel and delivers the coolant to the outlet port (lower left).



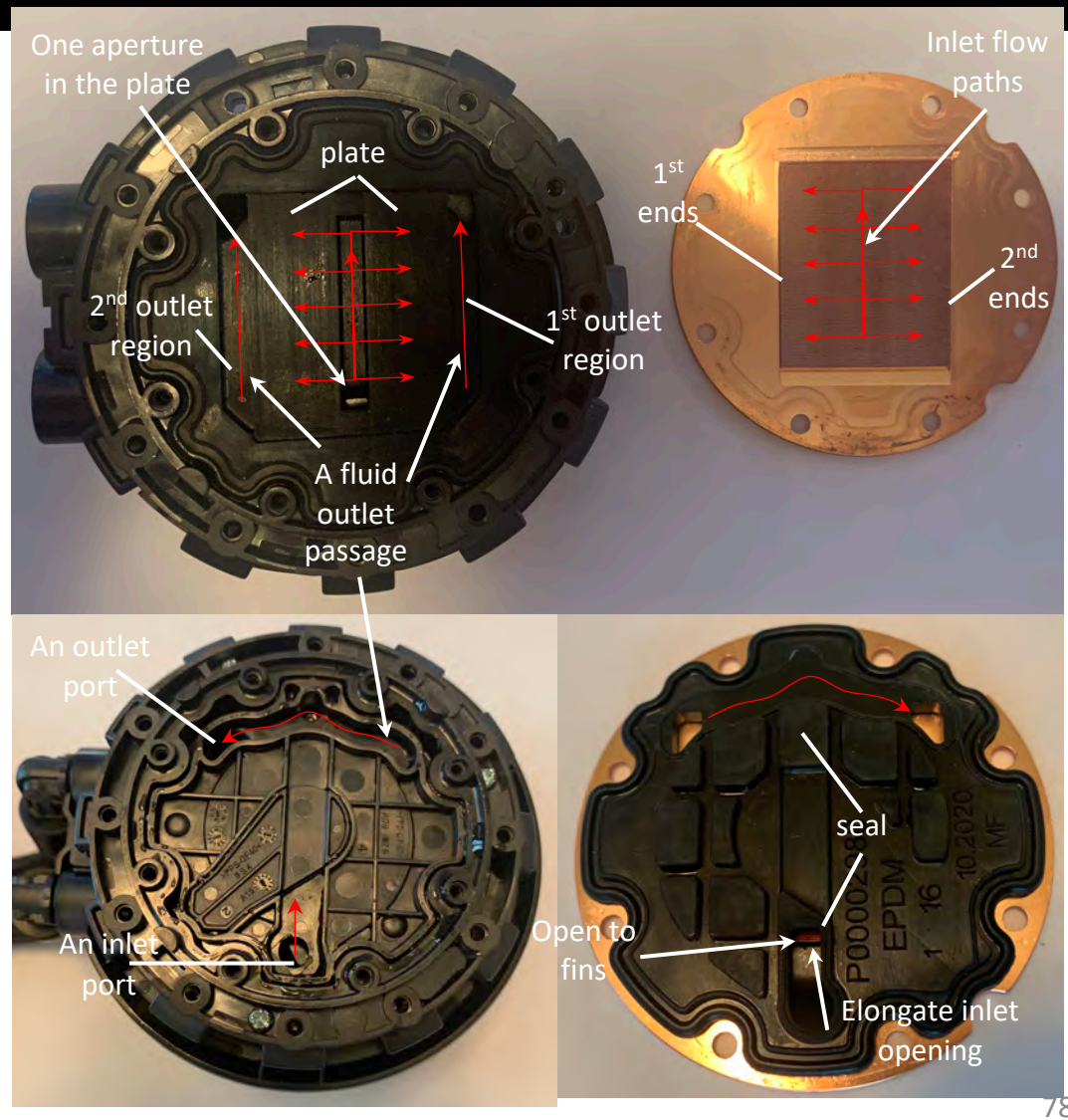
’266 Patent - Claim 13

’266 Patent Claim	Comparison to NZXT X53
13[d][1]. wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends,	The upper left image shows that the fluid outlet passage has a first outlet region positioned with no intervening solid structure between it and the microchannel first ends and a second outlet region positioned with no intervening solid structure between it and the microchannel second ends.



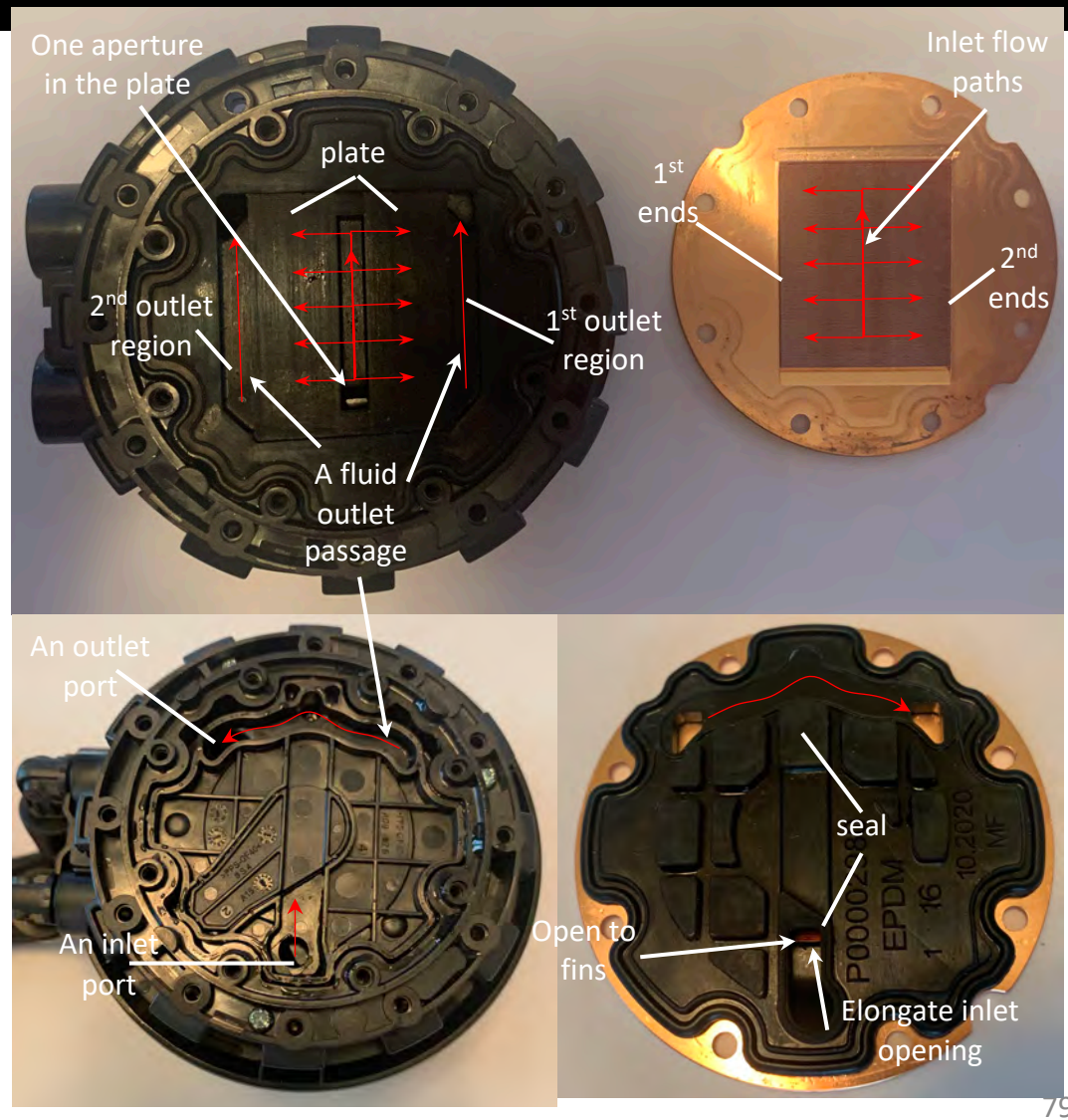
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to NZXT X53
13[d][2]. wherein the seal separates the fluid inlet passage from the fluid outlet passage;	The image at lower right shows that the seal separates the inlet passage from the outlet passage. Because of the seal’s position and fluid-tight engagement with the housing and the plate, coolant must flow through the microchannels as indicated by the red arrows (upper right image) before reaching the outlet passage, rather than short circuiting and bypassing the microchannels by flowing directly from the inlet passage to the outlet passage.



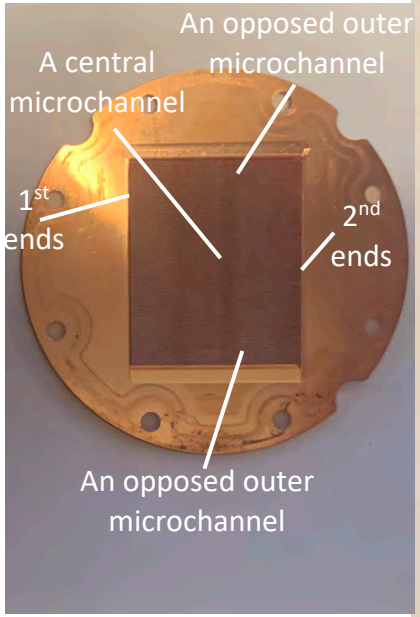
’266 Patent - Claim 13

’266 Patent Claim	Comparison to NZXT X53
13[d][3]. wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel,	As the red arrows in the upper right image indicate, the coolant enters each of the selected ”plurality of microchannels” and bifurcates into two sub flows within each microchannel: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.
13[d][4]. wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends,	As indicated in the upper left image, the first outlet region receives one of the two sub flows (outwardly facing red arrows at upper left and upper right) with no intervening solid structure between it and the microchannel first ends. Similarly, as shown in the upper left image, the second outlet region receives the other of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel second ends.
13[d][5]. wherein the two sub flows recombine in the outlet passage.	As indicated by the curved red arrows in the lower left and lower right images, the two sub flows recombine in the outlet passage, e.g., near the outlet port, similar to a disclosed embodiment in the ’266 patent. See, e.g., ’266 patent, FIG. 2 (showing that the sub flows recombine near the outlet port 128).



’266 Patent - Claim 15

’266 Patent Claim	Comparison to NZXT X53
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	As shown at right, the plurality of microchannels includes at least two outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels. As shown at far right, the first outlet region includes an outlet opening from each microchannel and the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels (e.g., lower right quadrant of the far right image).



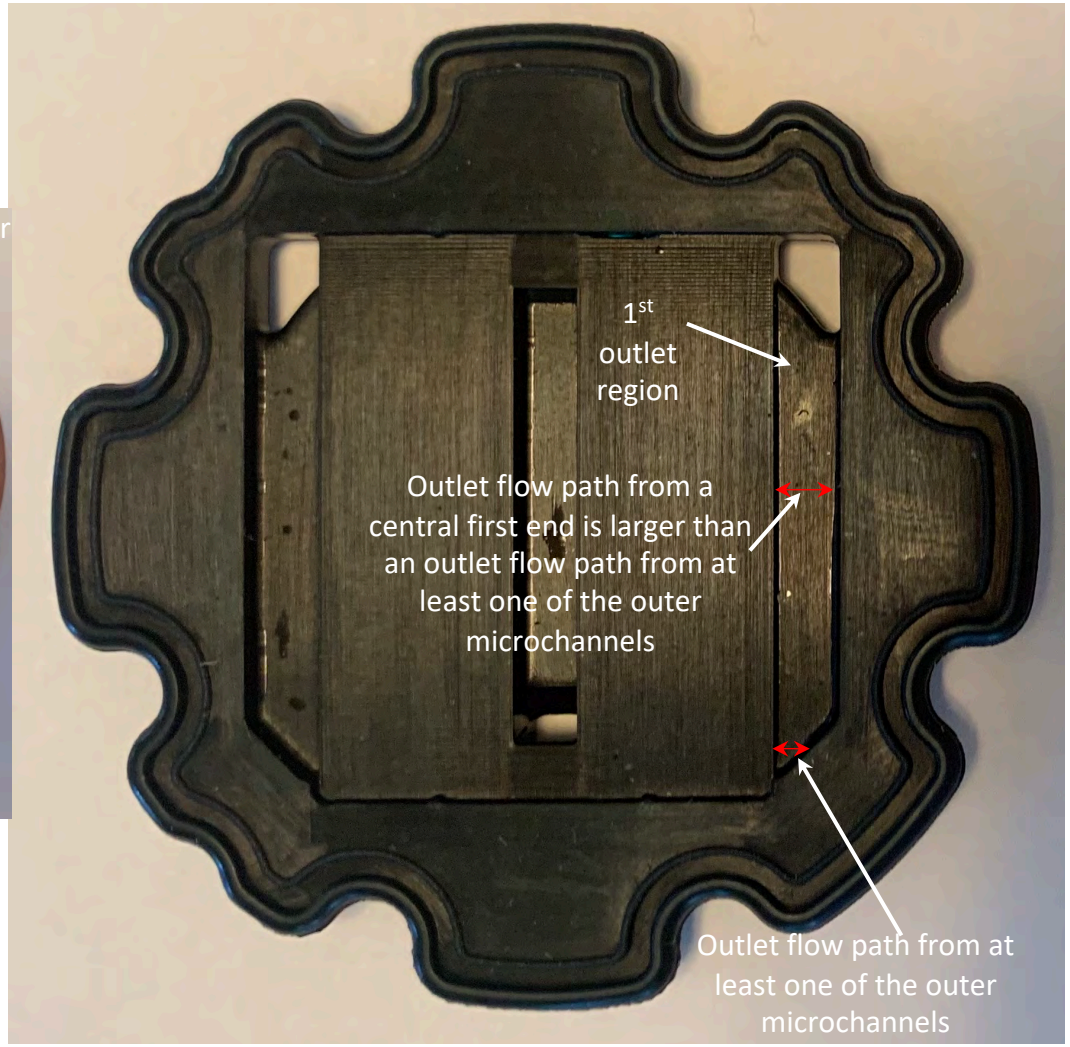
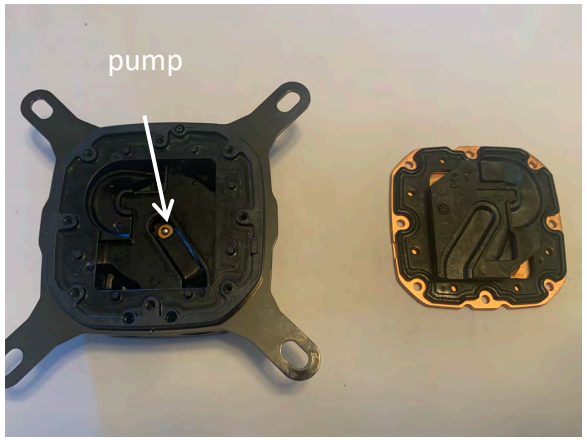


Exhibit D-5

CoolIT's HydroSeries product (represented by a Corsair iCue H100i RGB PRO XT device)

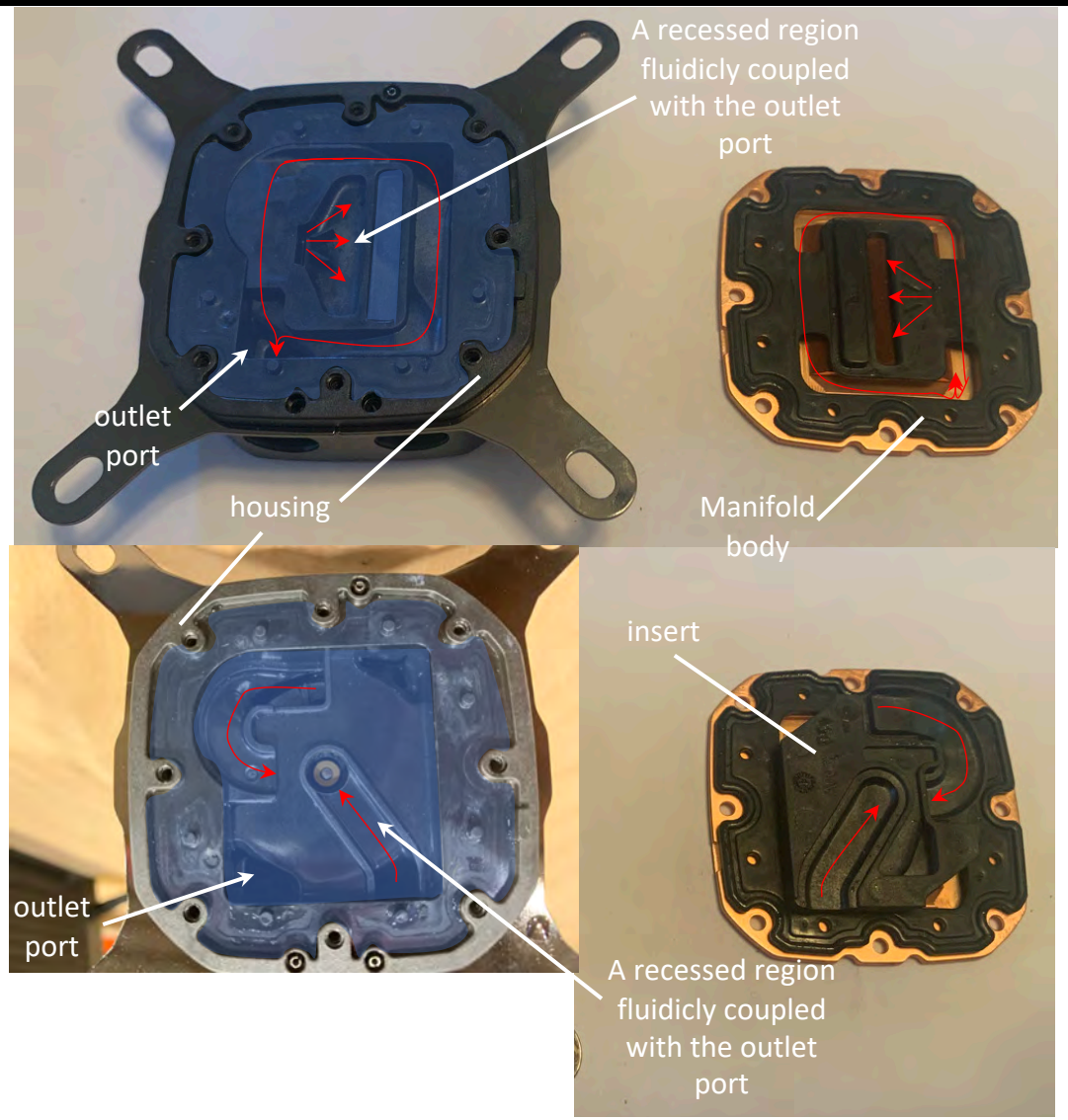
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Corsair iCue H100i
1. A heat exchange system comprising:	The H100i is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



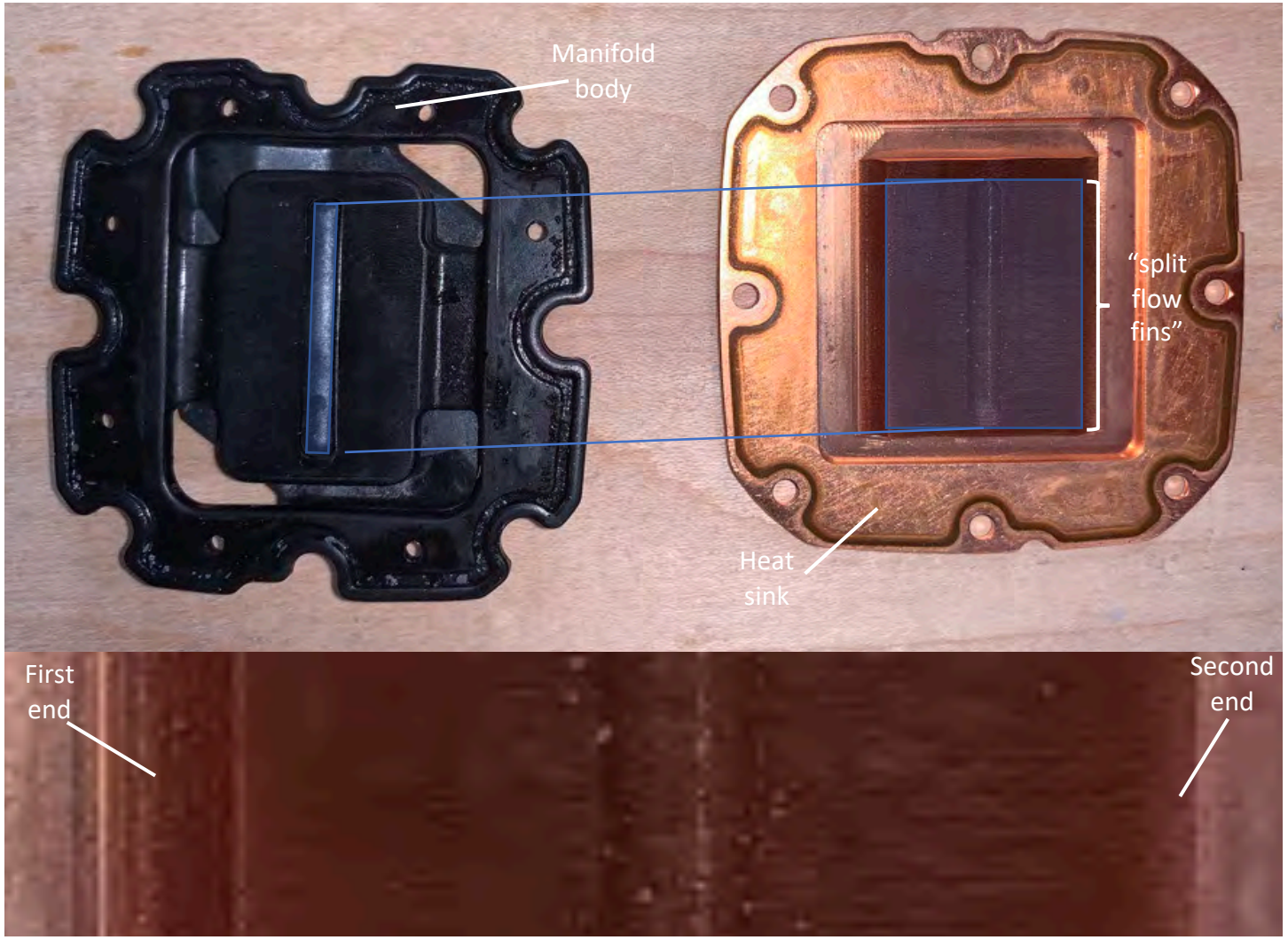
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Corsair iCue H100i
1[a]. a housing defining a recessed region and an outlet port fluidicly coupled with the recessed region;	The H100i device defines a recessed region and an outlet port fluidicly coupled with the recessed region. The images at top left and bottom left show the housing, together with an outlet port. In both images, each identified recessed region (blue shading) sits below and is set back from the fluted perimeter of the identified recessed region. As shown at top left, the assembled housing defines such a recess. As shown at bottom left (e.g., when the housing insert shown at lower right is removed), the housing defines a deeper recess (blue shaded area at lower left). The insert at upper left rests within the recess shown at lower left. Further, at upper left, the housing defines a further recessed region (darker blue shading) in which resides a portion of the compliant member (upper right). An outlet port defined by the housing (shown upper and lower left) receives coolant (indicated by red arrwos) that flows through each of the above-identified recessed regions as the coolant passes through the H100i’s cold-plate module. Thus, regardless of which recessed region is selected, the outlet port is fluidicly coupled with the selected recessed region.



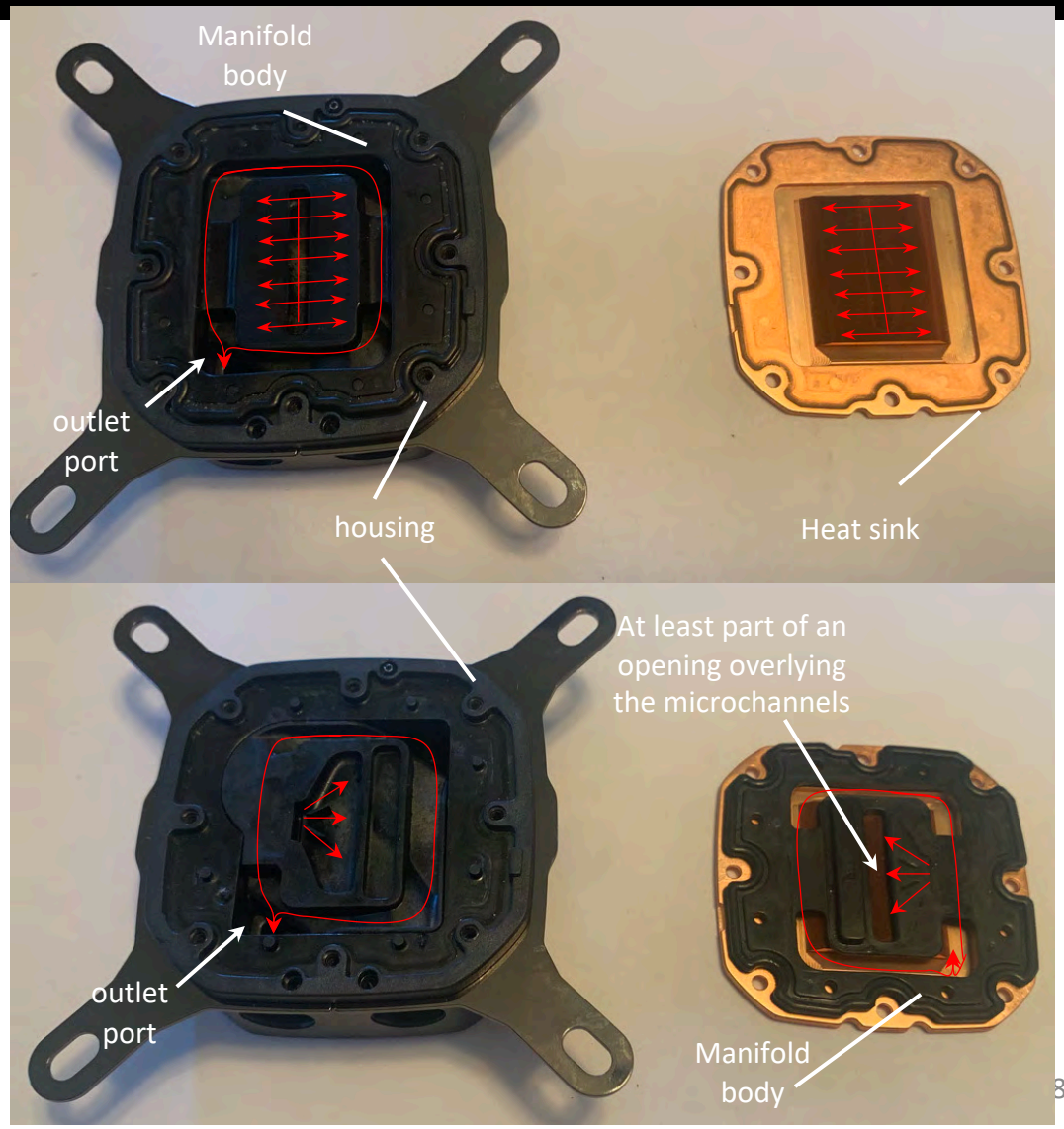
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Corsair iCue H100i
1[b]. a heat sink having a plurality of juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins;	The heat sink of the H100i device literally includes more than one fin, and this group of fins is spaced apart from each other without any intervening solid structure between them. And, the spacing between the fins define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the H100i satisfies the plurality of juxtaposed fins limitation. For example, the H100i device has a heat sink with a plurality of juxtaposed fins (e.g., each fin in the plurality of fins has no intervening solid structure between it and the next fin; right, shaded blue). The spacing between each pair of fins defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several spaced apart fins define a plurality of microchannels that correspond to the plurality of juxtaposed fins. As shown to the right, a group of juxtaposed fins and the corresponding plurality of microchannels are positioned beneath the opening (left, blue rectangle) in the manifold body. Each fin in this group is exposed directly to liquid flowing from the opening through the plate. These fins are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins.”



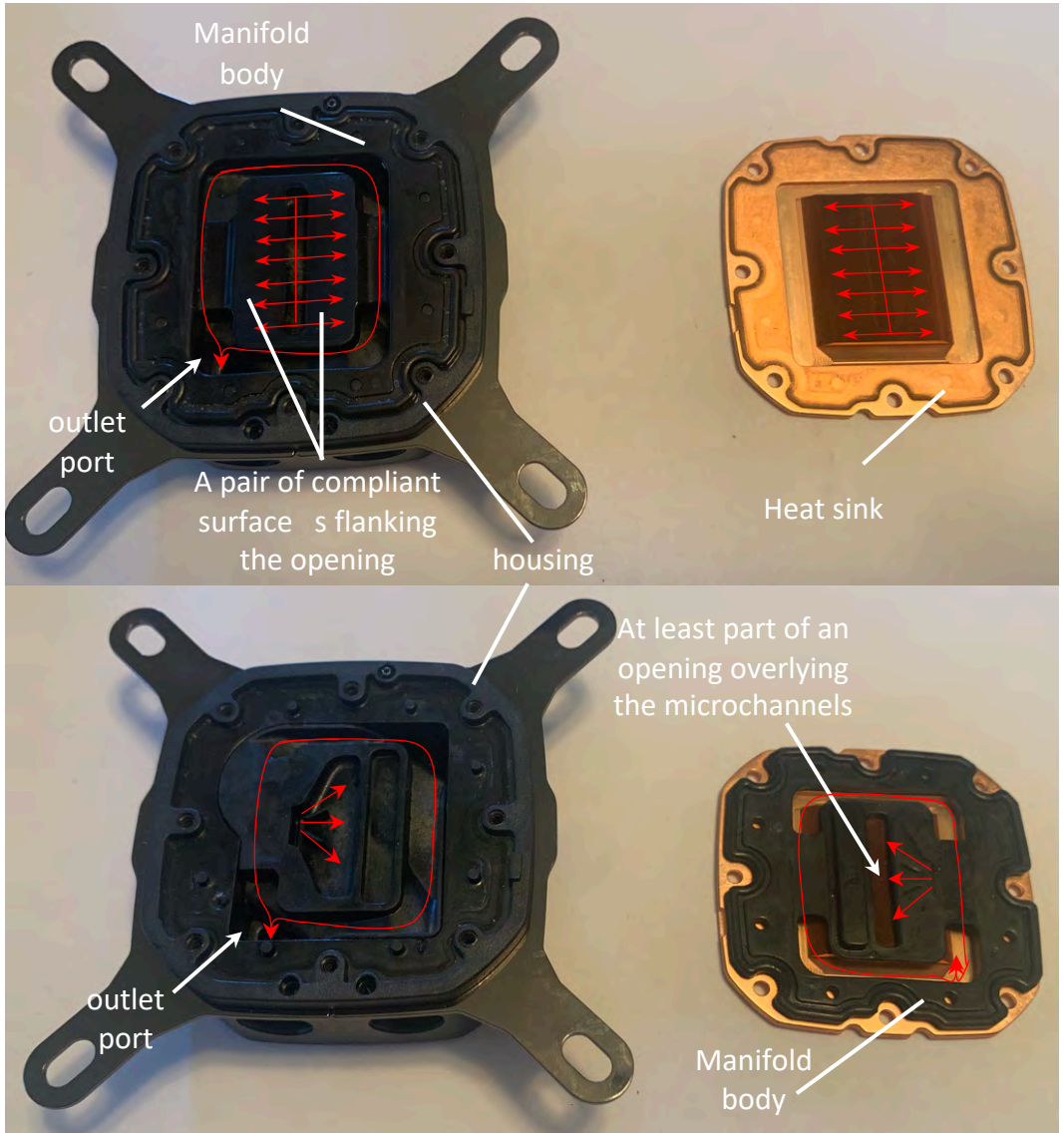
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Corsair iCue H100i
1[c]. a manifold body at least partially defining an opening overlying the microchannels,	As shown at upper left, the H100i device includes a manifold body. As shown at lower right, the manifold body overlies the microchannels, regardless of which definition of “plurality of fins” is used. As shown at upper left, the manifold body defines at least part of an opening positioned over the microchannels. This is shown at lower right (note that the fins defining the microchannels are visible through the manifold body).



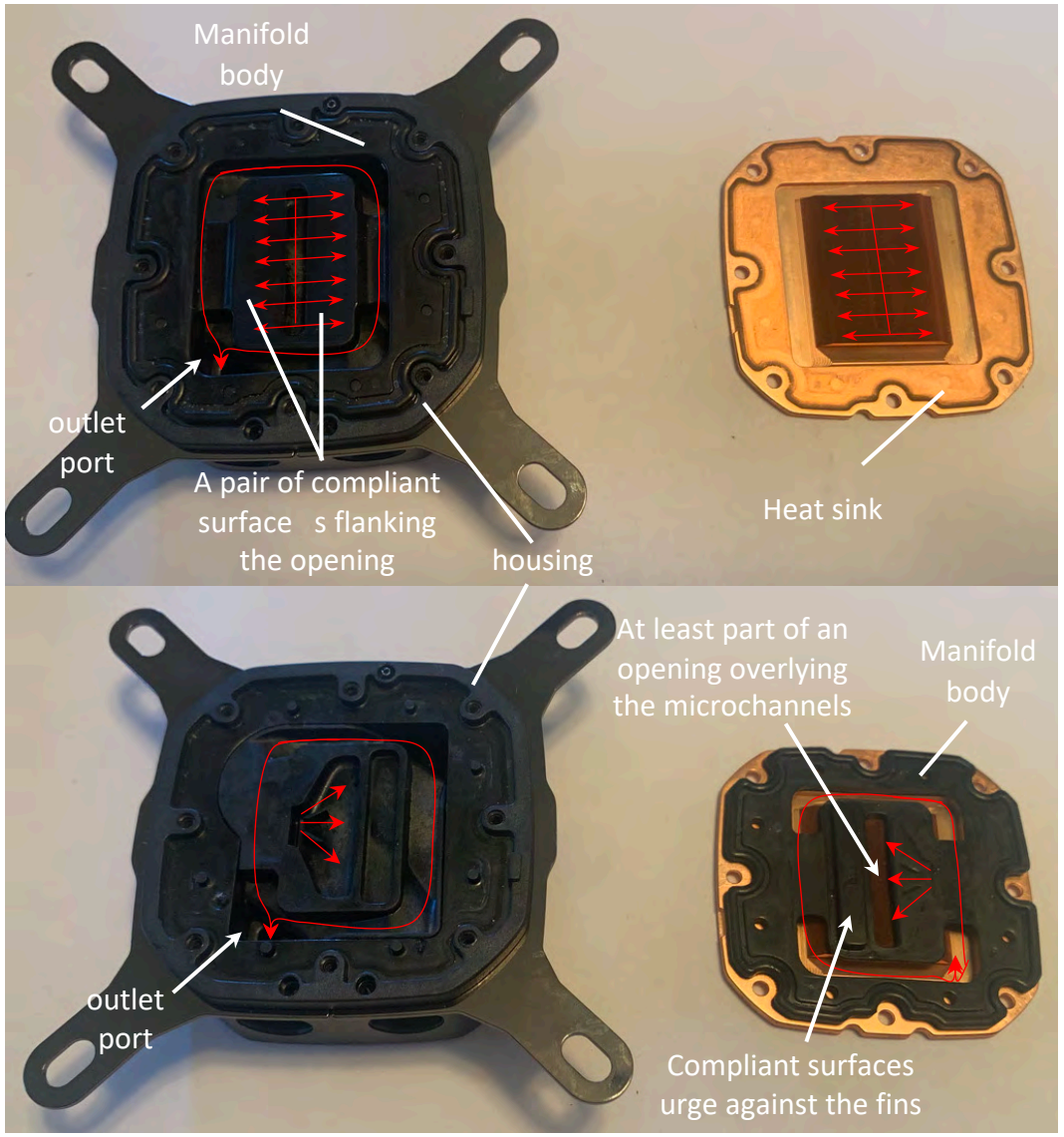
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Corsair iCue H100i
1[d]. wherein the manifold body defines a pair of compliant surfaces flanking the opening,	At upper left, the H100i’s device’s pair of compliant surfaces made of a compliant polymer (e.g., rubber) are shown flanking the opening.



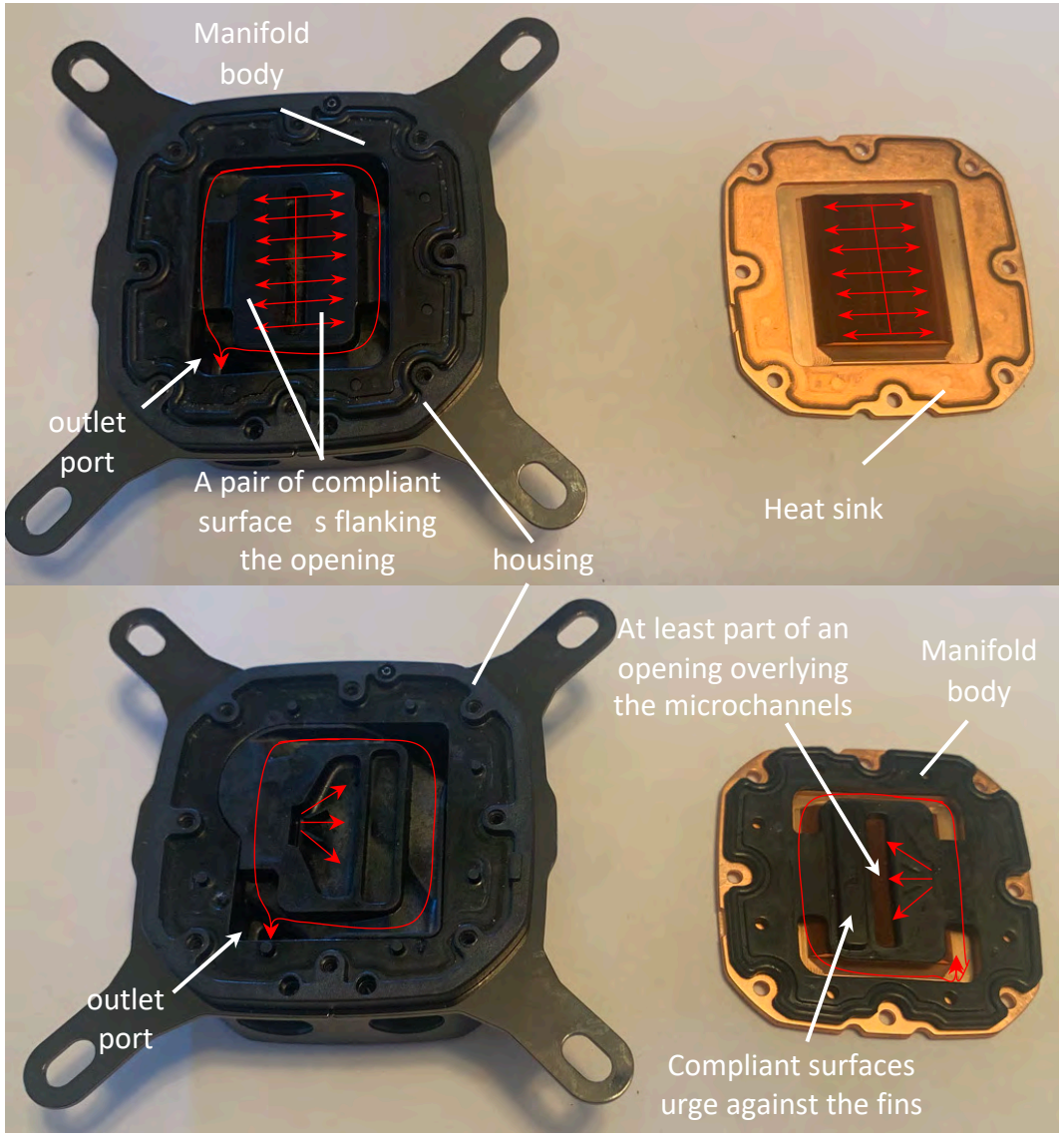
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Corsair iCue H100i
1[e]. wherein the compliant surfaces urge against the fins, defining a flow boundary of the microchannels,	When assembled as shown immediately below, the H100i’s cold-plate module compresses the manifold body (top left and lower right) between the heat sink and the housing, which urges the compliant surfaces against the fins and defines a flow boundary of the microchannels. The flow boundary inhibits coolant from leaking out of the microchannels, which would otherwise deteriorate cooling performance.



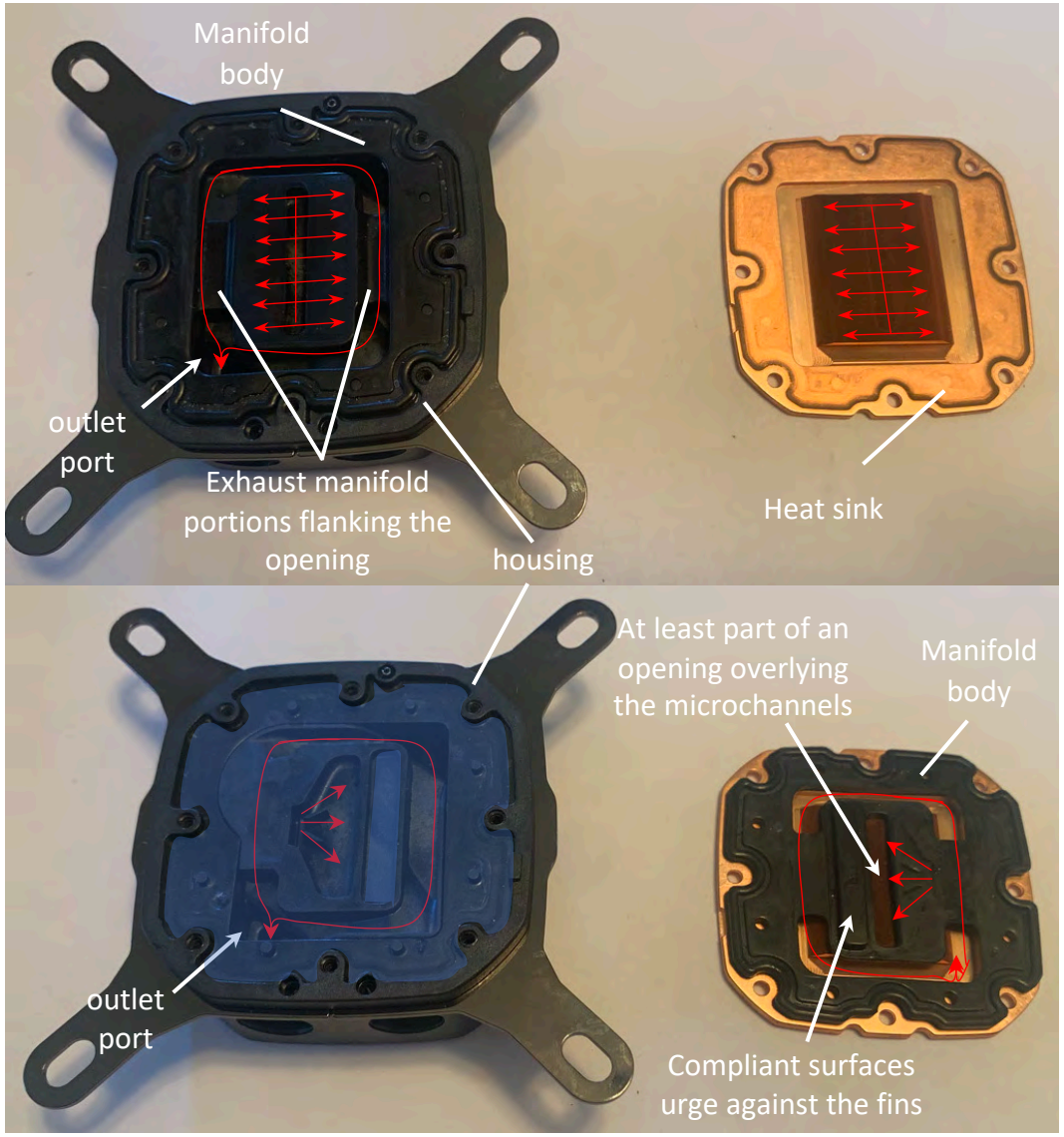
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Corsair iCue H100i
1[f]. wherein the opening extends transversely relative to the fins and is configured to distribute a working fluid among the microchannels,	As the upper left image shows, the opening extends transversely (e.g., across the tops of) the fins. The central red arrow shown at upper left lies within the opening (e.g., as a longitudinal axis of the opening) and is superimposed over the fins in the upper right image to indicate a flow of a working fluid being distributed among the microchannels. Further, the fins in the image at lower right are oriented as shown in the image at the upper right (note fins are visible through the opening). The lower right image clearly shows that the longitudinal axis of the opening extends transversely to the fins, which allows a working fluid to be distributed among the microchannels as the fluid passes through the opening into the microchannels during operation.



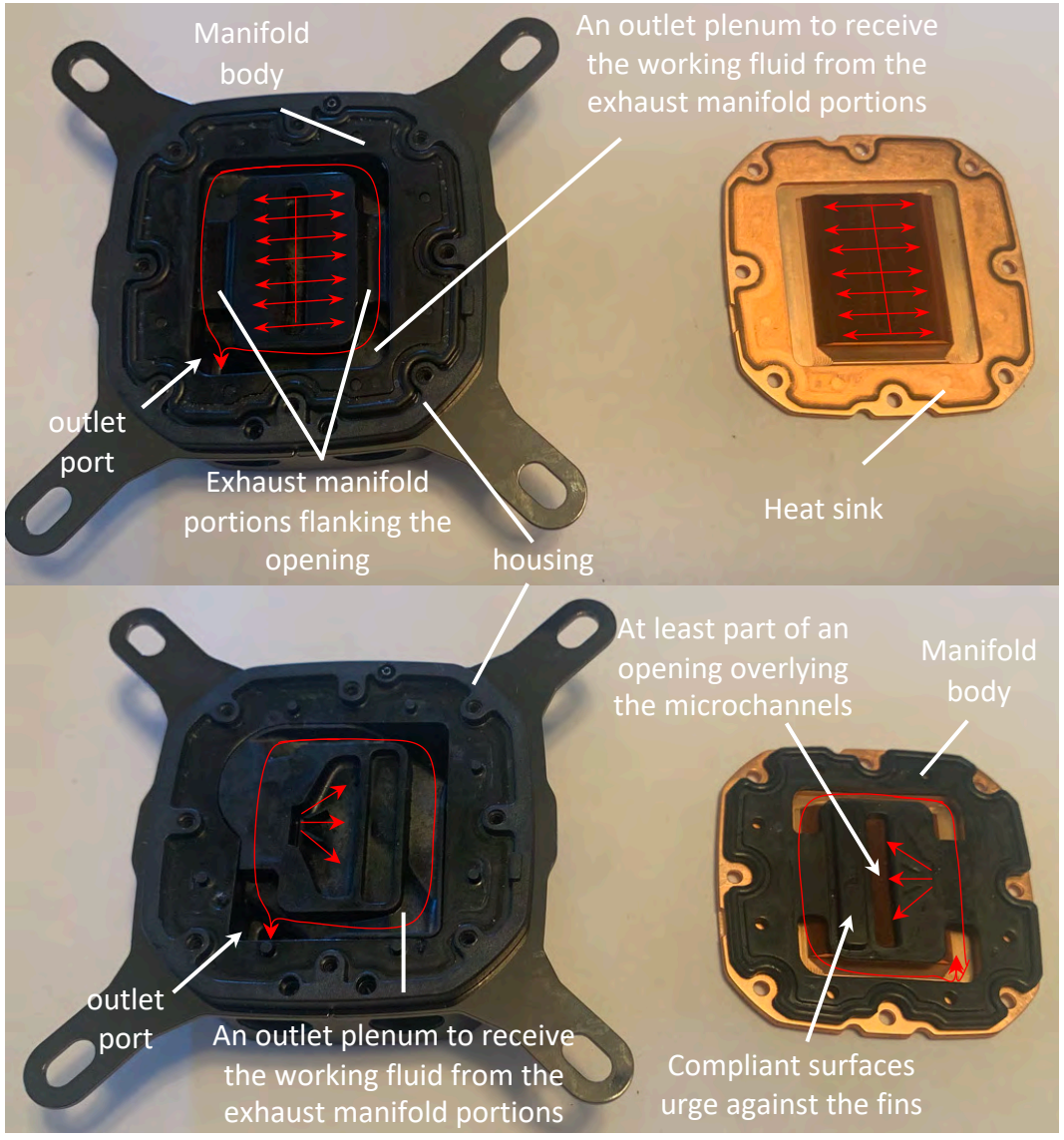
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Corsair iCue H100i
1[g]. wherein the manifold body partially occupies the recessed region of the housing, leaving a pair of opposed portions of the recessed region unfilled, defining opposed exhaust manifold portions flanking the opening and being configured to receive the working fluid from the microchannels, and	The upper left image shows the manifold body positioned within and thus partially occupying the recessed region of the housing (e.g., shown at lower left and on prior slides), regardless of which recessed region defined by the housing is selected. In leaving a pair of opposed portions of the selected recessed region unfilled, the manifold body defines opposed exhaust manifold portions flanking the opening, as shown at upper left. The outwardly directed red arrows shown at upper right indicate a flow of the working fluid through the microchannels. The outwardly directed red arrows are superimposed on the image at upper right, showing that the outwardly directed flows of the working fluid through the microchannels enter the opposed exhaust manifold portions. Thus, the opposed exhaust manifold portions flanking the opening are configured to receive the working fluid from the microchannels, as claimed.



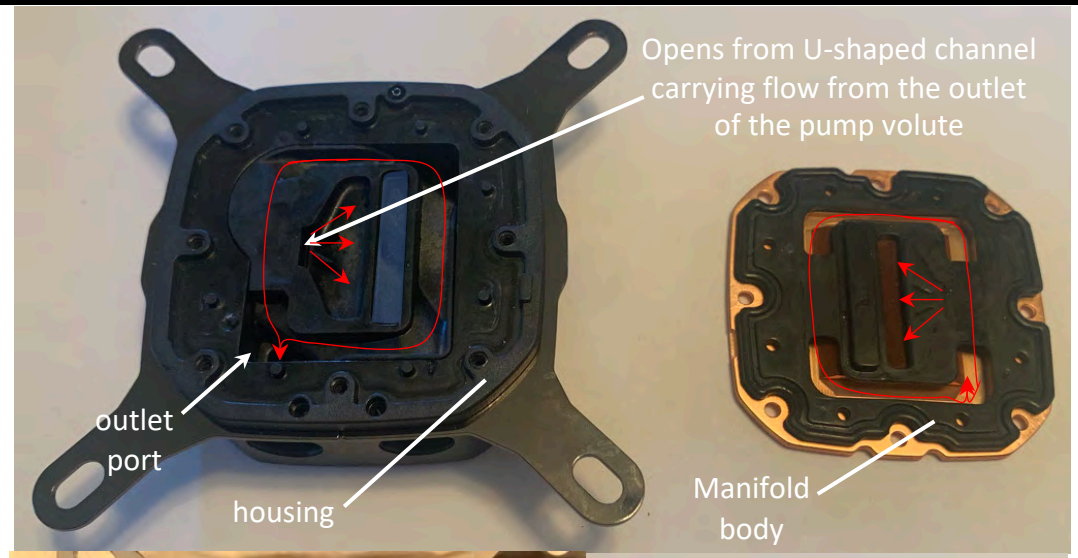
’266 Patent - Claim 1

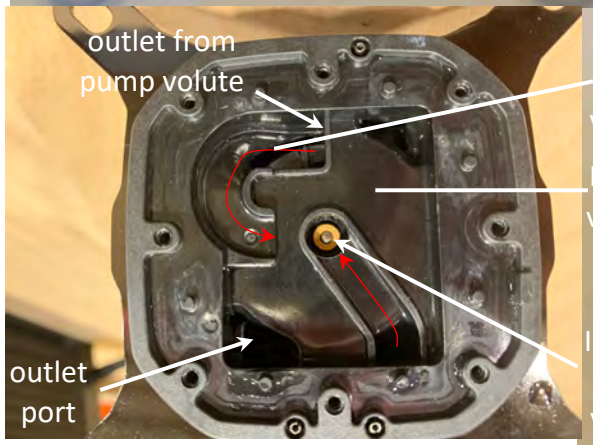
’266 Patent Claim	Comparison to Corsair iCue H100i
1[h]. wherein the housing further defines an outlet plenum configured to receive the working fluid from the exhaust manifold portions and to convey the working fluid to the outlet port.	The image at lower left shows an outlet plenum that receives the working fluid from the exhaust manifold portions. The outlet plenum conveys the working fluid to the outlet port.

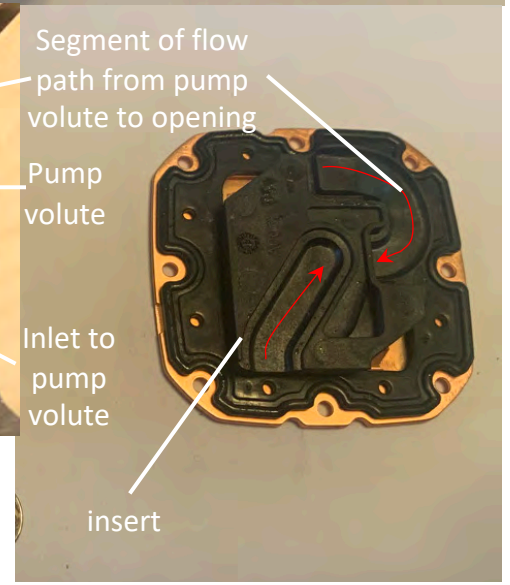


’266 Patent - Claim 2

’266 Patent Claim	Comparison to Corsair iCue H100i
2. The heat exchange system according to claim 1, wherein the housing defines a pump volute and a segment of a flow path, the segment configured to convey the working fluid from the pump volute to the opening at least partially defined by the manifold body, the heat exchange system further comprising an impeller positioned in the pump volute and configured to urge the working fluid along the flow path.	The top left image shows the assembled housing and the bottom left image reveals additional detail, including an external surface of the pump volute. In the bottom left image, a piece of the housing has been removed. (The lower right image shows the removed piece.) As well, the housing defines a segment of a flow path (U-shaped channel with the curved red arrow; lower left image) configured to convey the working fluid from the pump volute to the opening defined in part by the manifold body.

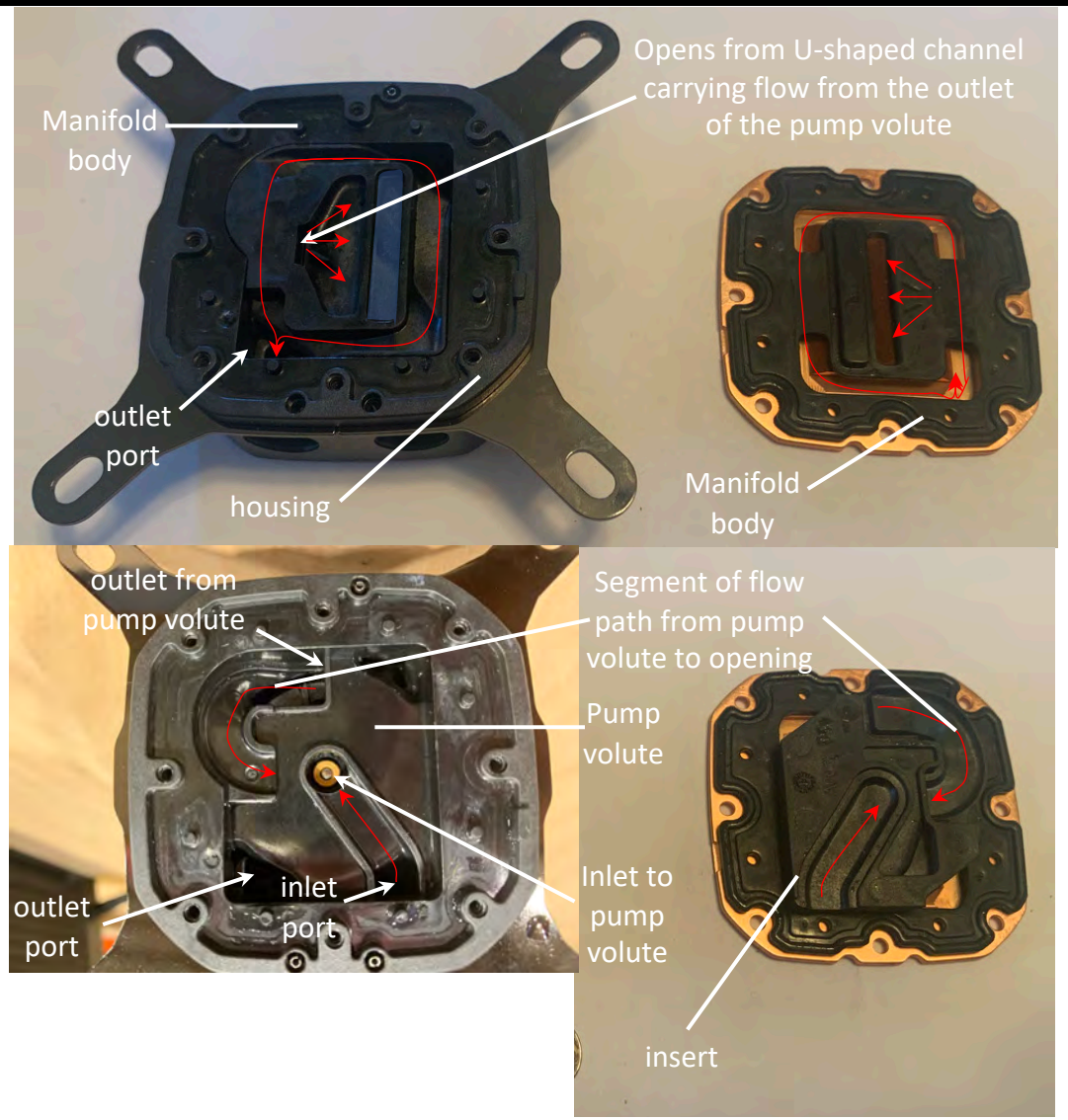






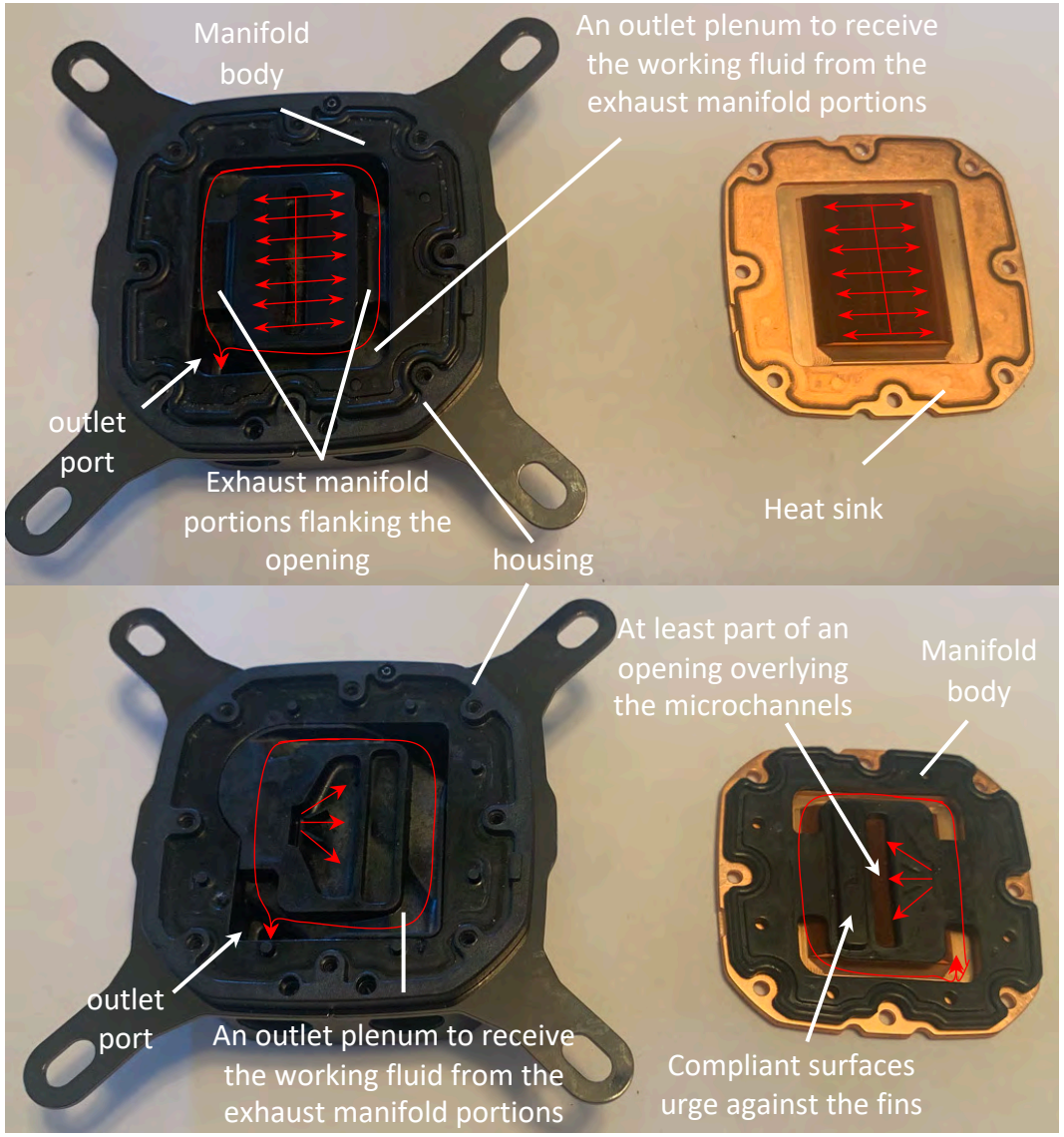
’266 Patent - Claim 5

’266 Patent Claim	Comparison to Corsair iCue H100i
5. The heat exchange system according to claim 2, wherein the housing defines an inlet port, wherein the flow path extends from the inlet port to the outlet port and is configured to convey the working fluid from the inlet port through the pump volute, the manifold body, the microchannels, the opposed exhaust manifold portions, and the outlet plenum to the outlet port.	The lower left image shows an inlet port and the outlet port. The red arrows indicate the path that the working fluid follows through the cold-plate module of the H100i device. As indicated at lower left, the fluid enters from the inlet port and flows through a channel into an entrance to the pump volute. On entering the pump volute (lower left), the spinning impeller (only axel of impeller shown, center lower left image) imparts momentum to the working fluid, which exits the pump volute along the indicated segment of the flow path (lower left and lower right images) passing through the manifold body (upper left image) and entering the microchannels (upper right image). The opposed exhaust manifold portions (upper left image) collect the working fluid from the microchannels and the working fluid follows the flow path into the outlet plenum (curved red arrows in upper left), which conveys the working fluid to the outlet port (upper left).



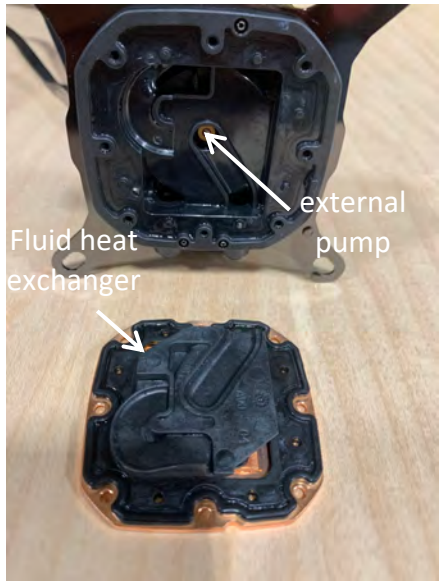
’266 Patent - Claim 9

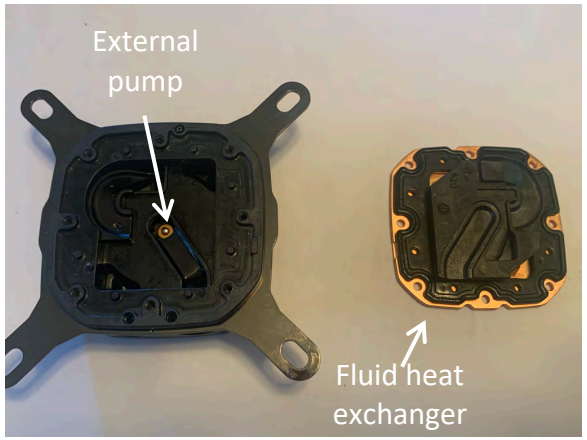
’266 Patent Claim	Comparison to Corsair iCue H100i
9. The heat-exchange module according to claim 1, wherein a flow of the working fluid defines a flow path, wherein the flow path is distributed among the plurality of microchannels, and, within each microchannel, the flow path bifurcates into a pair of opposed sub-flow paths directed away from each other.	Coolant flow through the H100i device defines a flow path. Red arrows superimposed on the images at right indicate the flow path. After exiting the pump, the coolant passes into the opening overlying the microchannels (indicated by central, outwardly fanning red arrows in lower left image). As the coolant flows over top the microchannels, the coolant flow (and thus the path the flow defines) is distributed among the plurality of microchannels, as indicated by the red arrows superimposed on the upper right image and the outwardly fanning arrows in the lower left image. The coolant flow enters each of the microchannels and, within each microchannel, splits (or bifurcates) into outwardly directed sub-flows (indicated by the outwardly directed red arrows superimposed on the upper right image). Thus, the coolant flow defines a flow path that bifurcates within each microchannel into a pair of opposed sub-flow paths directed away from each other, as claim 9 recites



’266 Patent - Claim 13

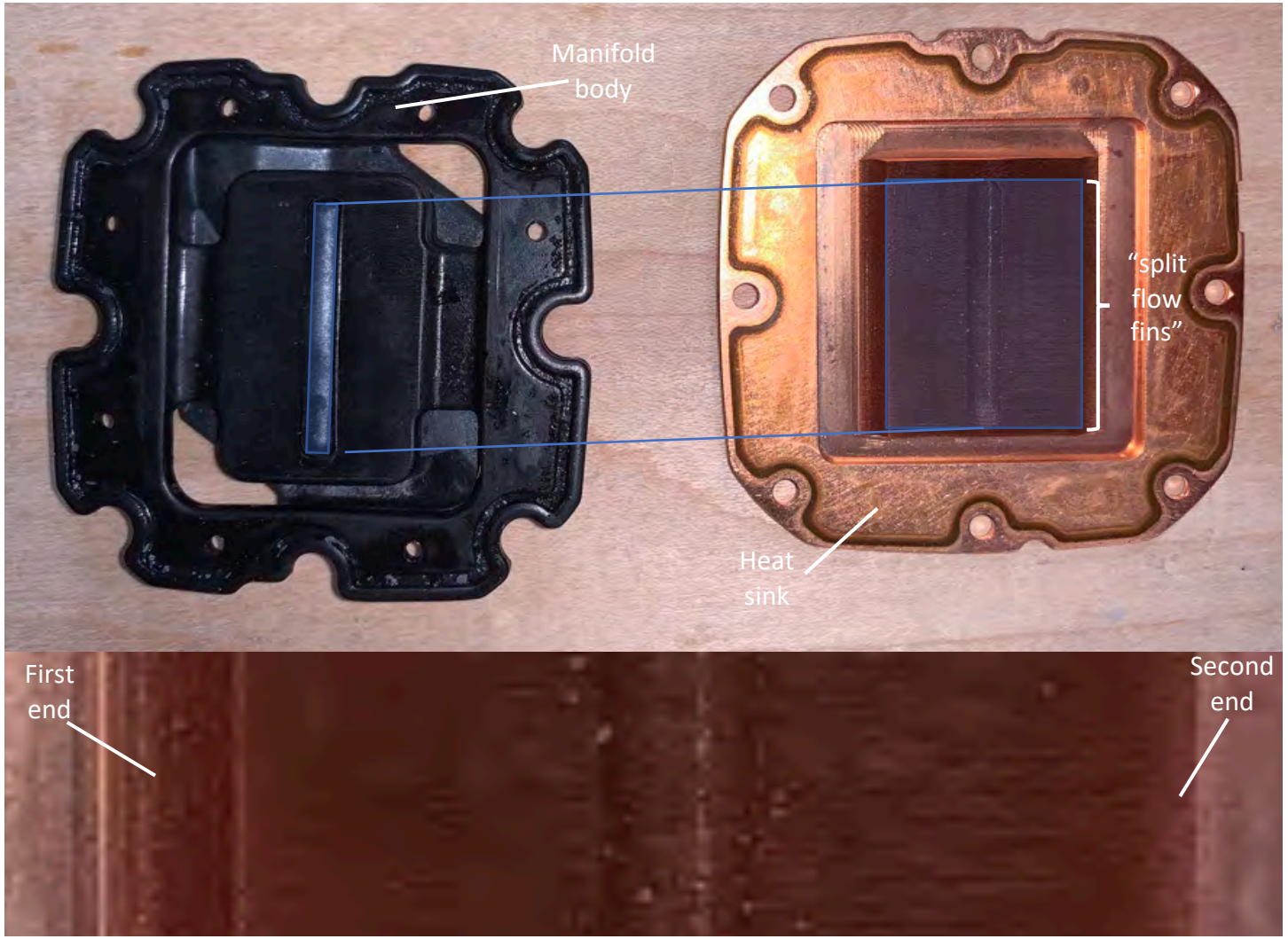
’266 Patent Claim	Comparison to Corsair iCue H100i
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The H100i device includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the H100i device has a copper heat spreader plate and a housing separable from the pump. Thus, the H100i device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component." As shown to the right, the pump is external to the component that transfers heat from a heat source to a cooling liquid. The plastic housing can be sectioned parallel to the copper plate to define a pump external to the component (e.g., below the plane of the section).





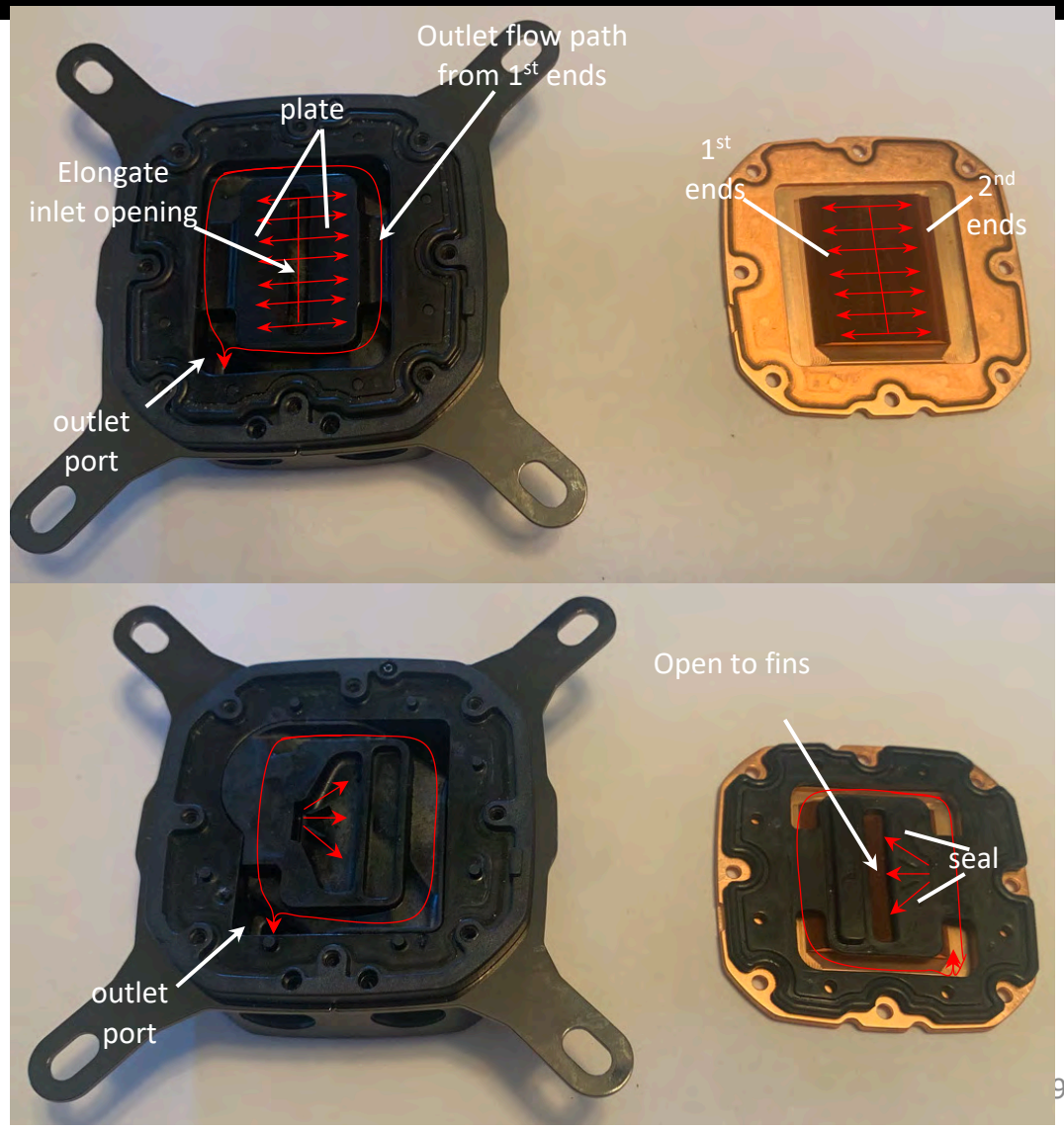
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Corsair iCue H100i
13[a]. a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;	The H100i literally includes more than one wall, and this group of walls is spaced apart from each other, defining channels. And, the spacing between the walls define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the H100i satisfies the plurality of walls limitation. For example, the H100i has several spaced-apart walls (e.g., right, shaded blue). The spacing between each pair of walls defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several walls define a plurality of microchannels that correspond to the walls. As shown to the right, a group of walls and microchannels (left) is positioned beneath the opening (right) in the plate. Each wall in this group is exposed directly to liquid flowing from the opening through the plate. These walls are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “plurality of walls.” Each microchannel extends from a first end to a second end.



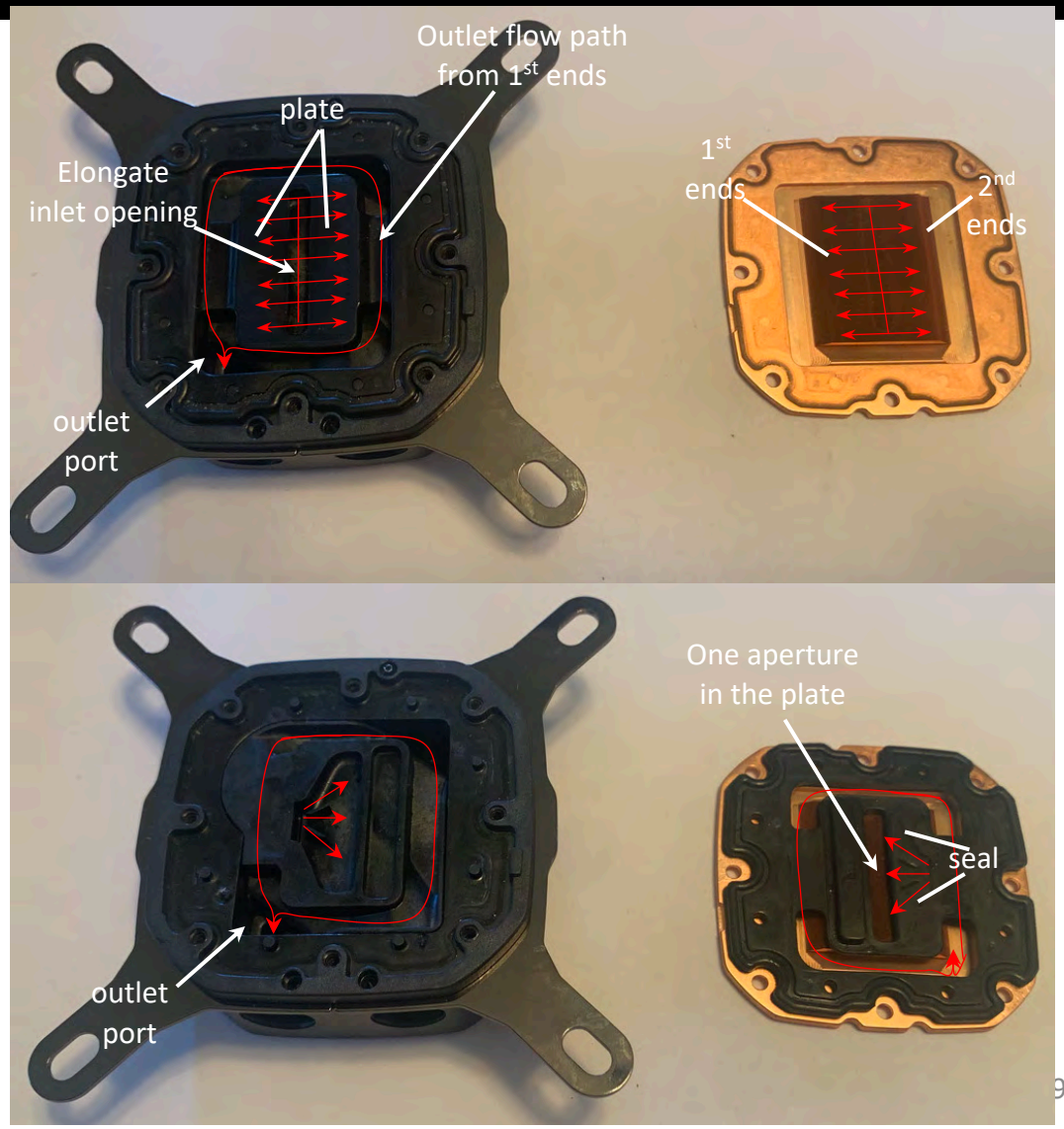
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Corsair iCue H100i
13[b]. a plate overlying the walls; and a seal, wherein the seal is a portion of the plate;	The top left image shows a plate that overlies the plurality of walls, whether the plurality of walls is identified as the “split-flow fins” or another selected group of fins containing more than one fin. The lower right image shows the plate overlying the fins, as well as the seal being a separately identifiable structure that is formed as a unitary construct with the plate (upper left image). Thus, the seal constitutes a portion of the plate as claimed. See, ’266, col. 12:43-44 (“Seal 230 may be installed as a portion of the plate or separately.”); FIGS. 5 and 6 (illustrating the seal 230 as being structure that is continuous and monolithic with the plate 240 and tabs 242).



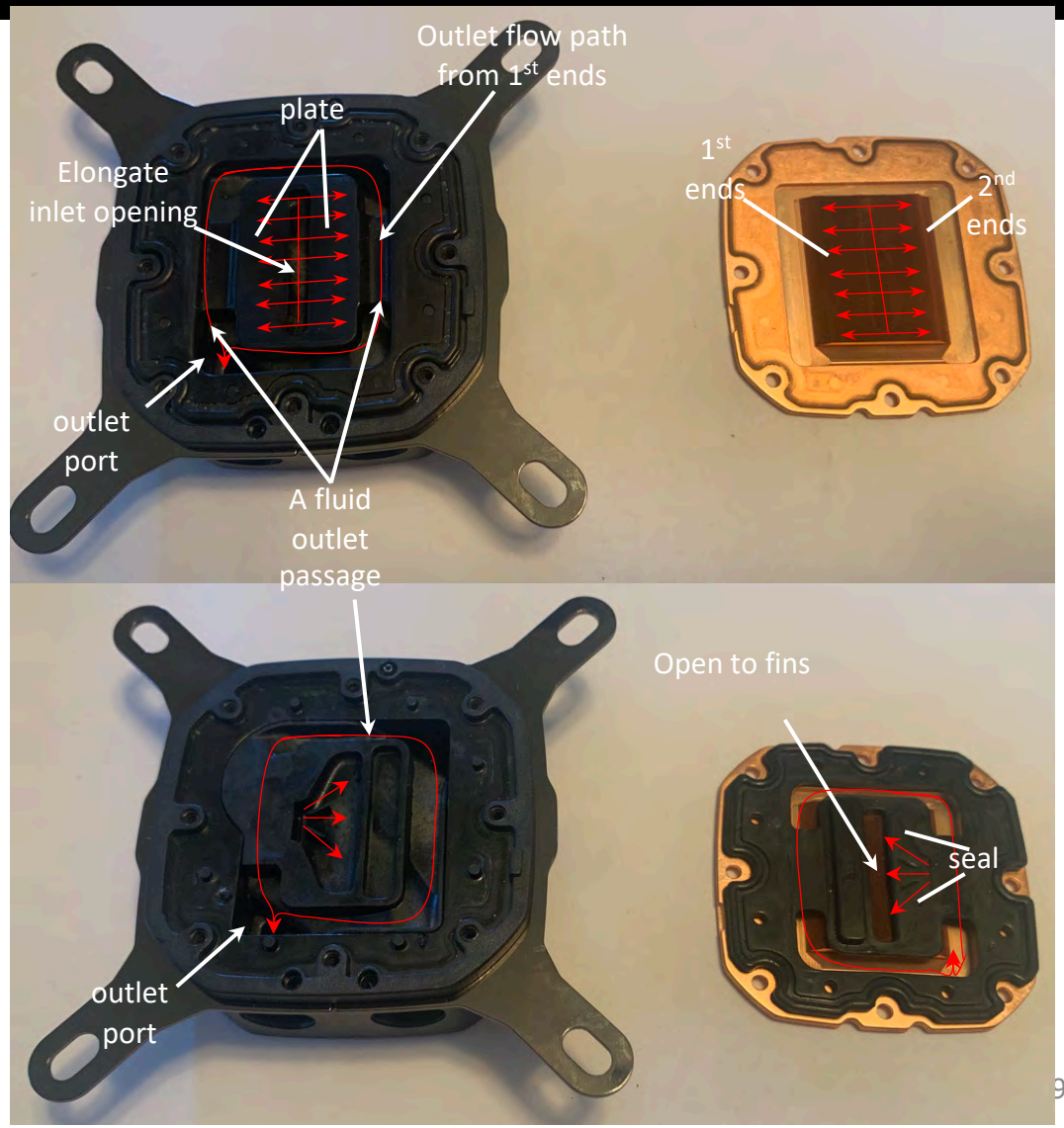
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Corsair iCue H100i
13[c]. a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;	The lower right and upper left images show a portion of a fluid inlet passage that delivers coolant through one aperture in the plate to each microchannel (indicated by vertical red line in image at upper right). The fluid inlet passage delivers the heat-exchange fluid to each microchannel at a position between the first and second end of each respective microchannel (indicated by vertical red line in image at upper right).



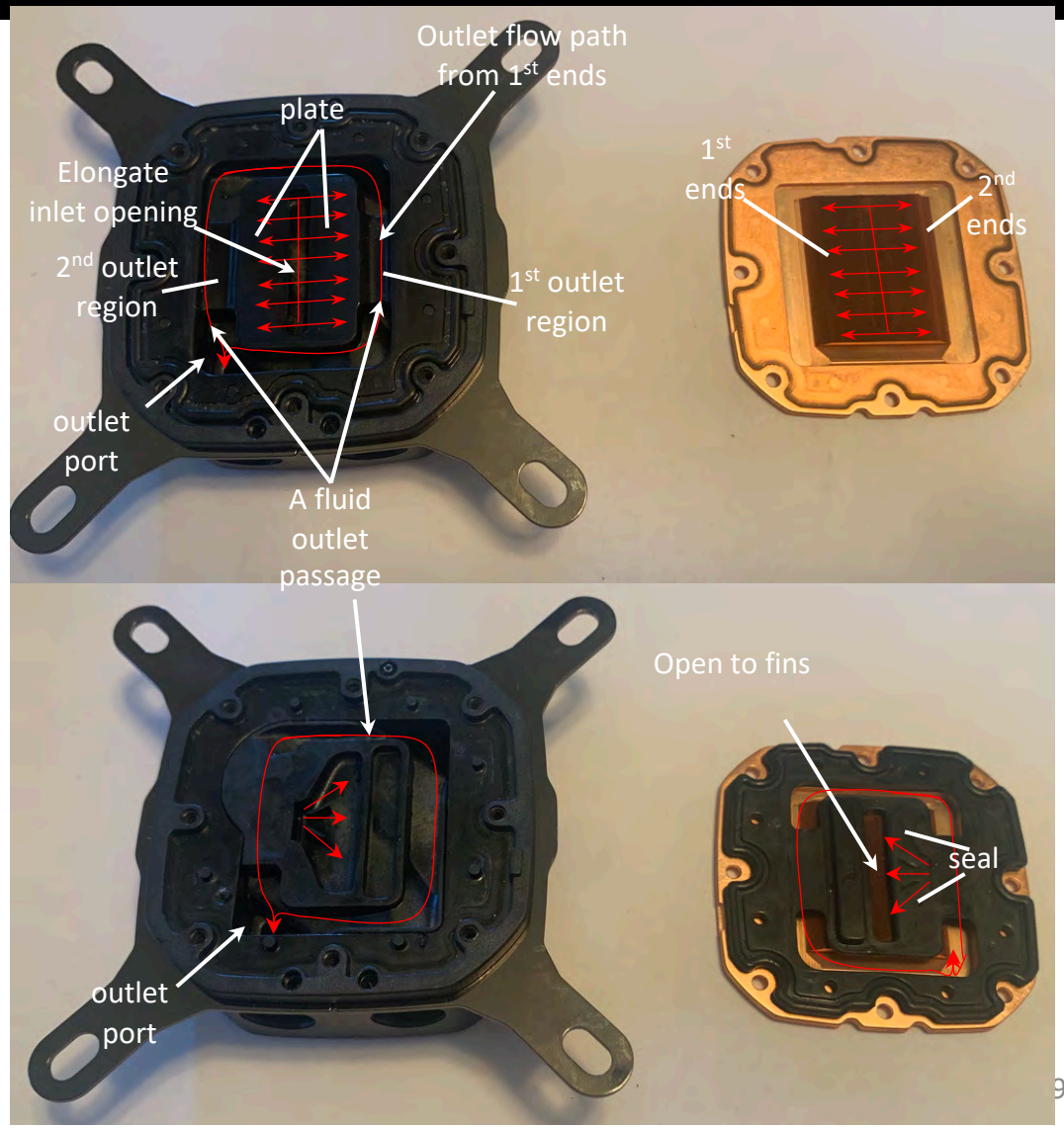
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Corsair iCue H100i
13[d]. a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel,	The image at upper left shows a fluid outlet passage configured to receive the heat exchange fluid from the first end and the second end of each microchannel. As the red arrows in the upper right image indicate, the coolant enters the microchannels and bifurcates into two sub flows: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage (indicated by the curved red arrows at lower left, which are superimposed on the image at lower right) receives the coolant from both ends of each microchannel and delivers the coolant to the outlet port (lower left).



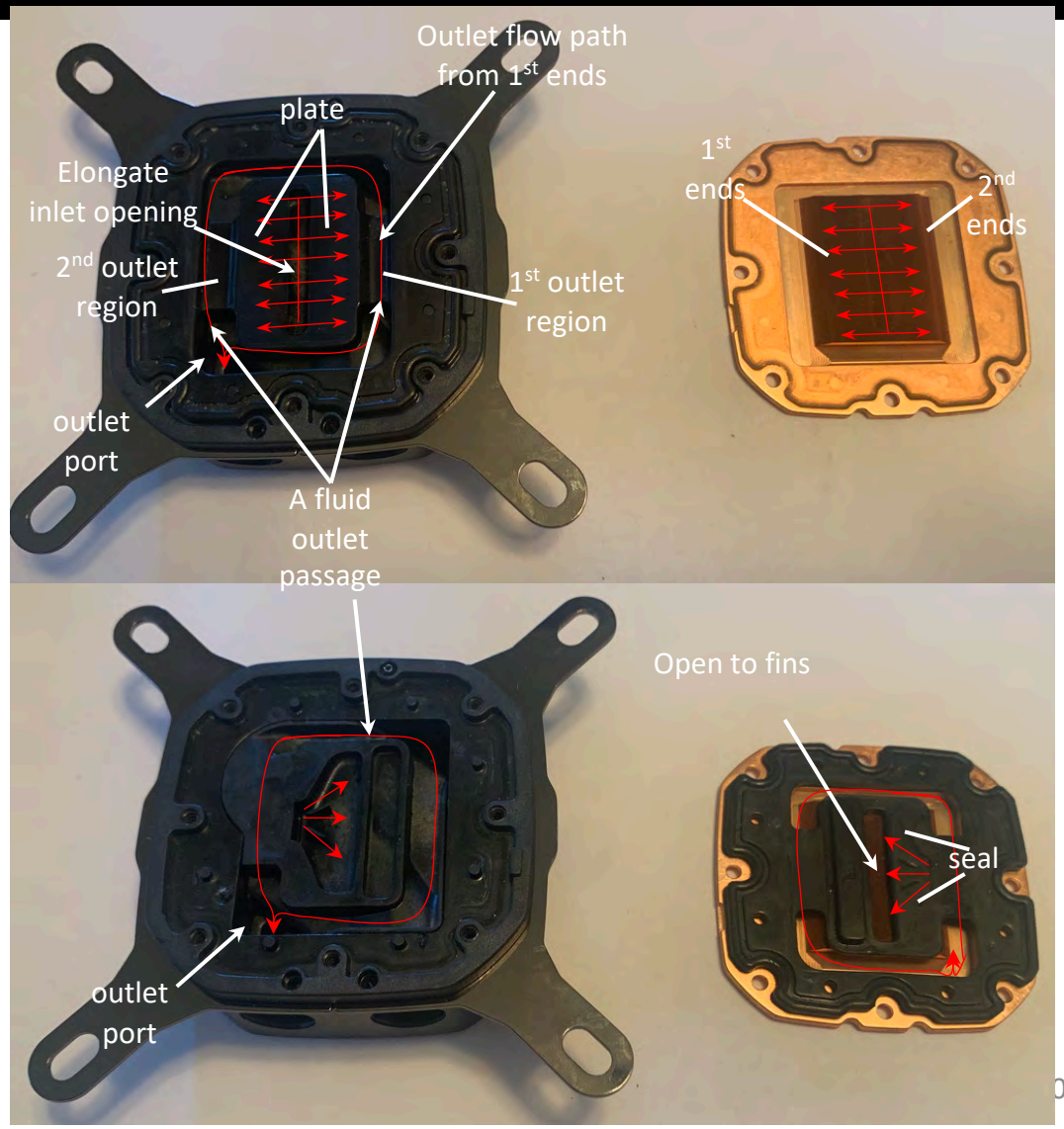
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Corsair iCue H100i
13[d][1]. wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends,	The upper left image shows that the fluid outlet passage has a first outlet region positioned with no intervening solid structure between it and the microchannel first ends and a second outlet region positioned with no intervening solid structure between it and the microchannel second ends.



’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Corsair iCue H100i
13[d][2]. wherein the seal separates the fluid inlet passage from the fluid outlet passage;	The image at lower right shows that the seal separates the inlet passage from the outlet passage. Because of the seal’s position and fluid-tight engagement with the housing and the plate, coolant must flow through the microchannels as indicated by the red arrows (upper right image) before reaching the outlet passage, rather than short circuiting and bypassing the microchannels by flowing directly from the inlet passage to the outlet passage.



’266 Patent - Claim 13

’266 Patent Claim	Comparison to Corsair iCue H100i
13[d][3]. wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel,	As the red arrows in the upper right image indicate, the coolant enters each of the selected ”plurality of microchannels” and bifurcates into two sub flows within each microchannel: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.
13[d][4]. wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends,	As indicated in the upper left image, the first outlet region receives one of the two sub flows (outwardly facing red arrows at upper left and upper right) with no intervening solid structure between it and the microchannel first ends. Similarly, as shown in the upper left image, the second outlet region receives the other of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel second ends.
13[d][5]. wherein the two sub flows recombine in the outlet passage.	As indicated by the curved red arrows in the lower left and lower right images, the two sub flows recombine in the outlet passage, e.g., near the outlet port, similar to a disclosed embodiment in the ’266 patent. See, e.g., ’266 patent, FIG. 2 (showing that the sub flows recombine near the outlet port 128).

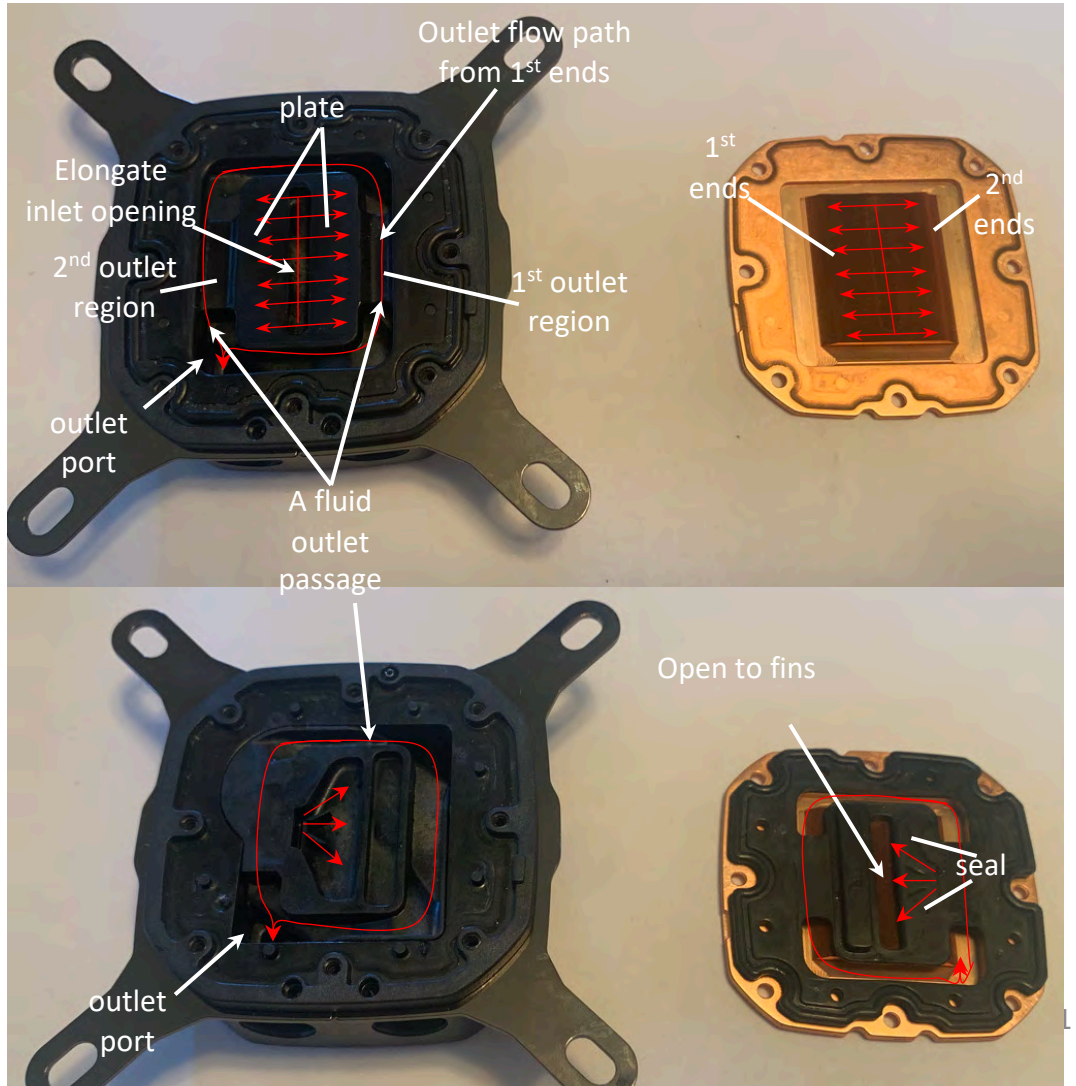
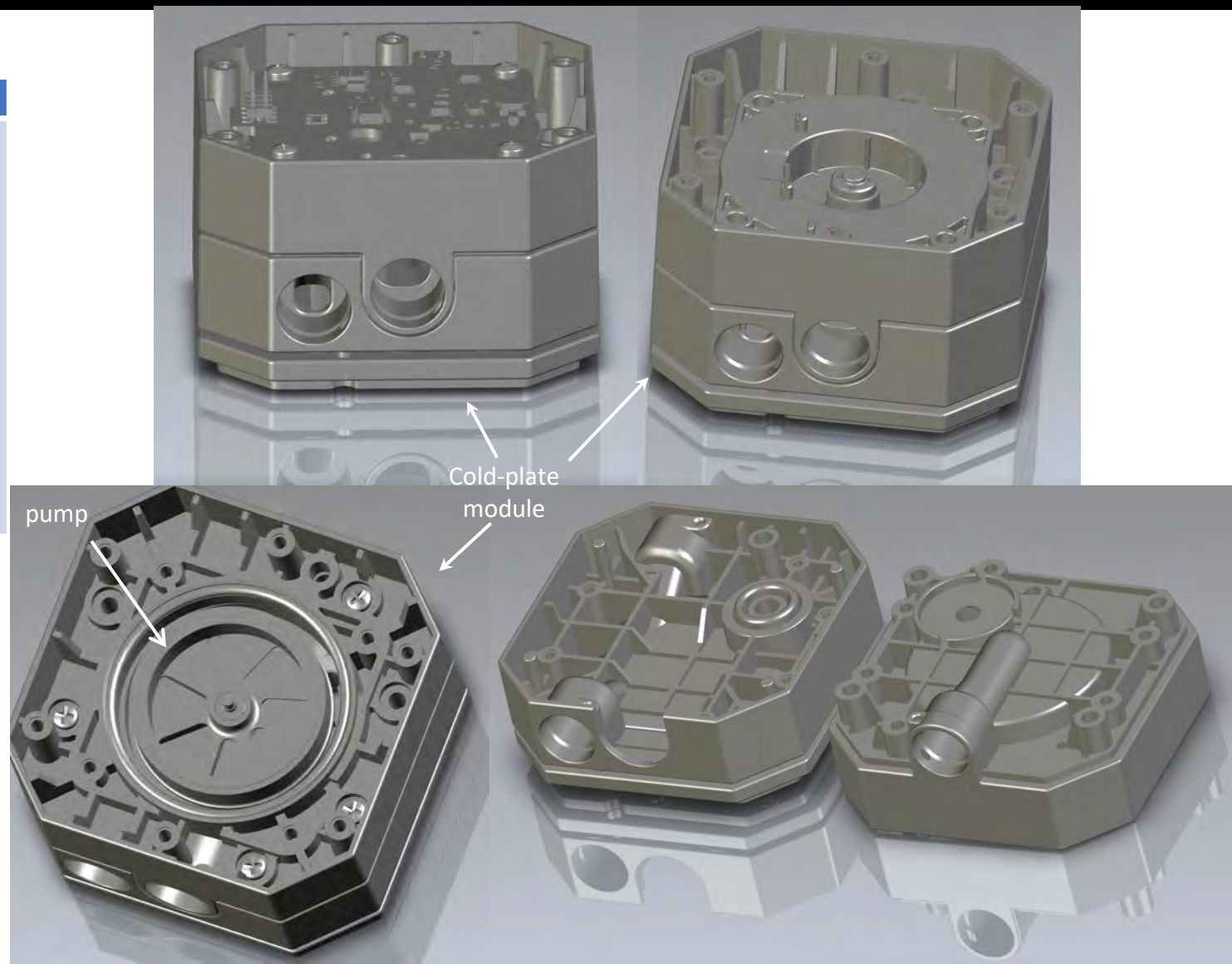


Exhibit D-6

CoolIT's New Design (represented by CAD files)

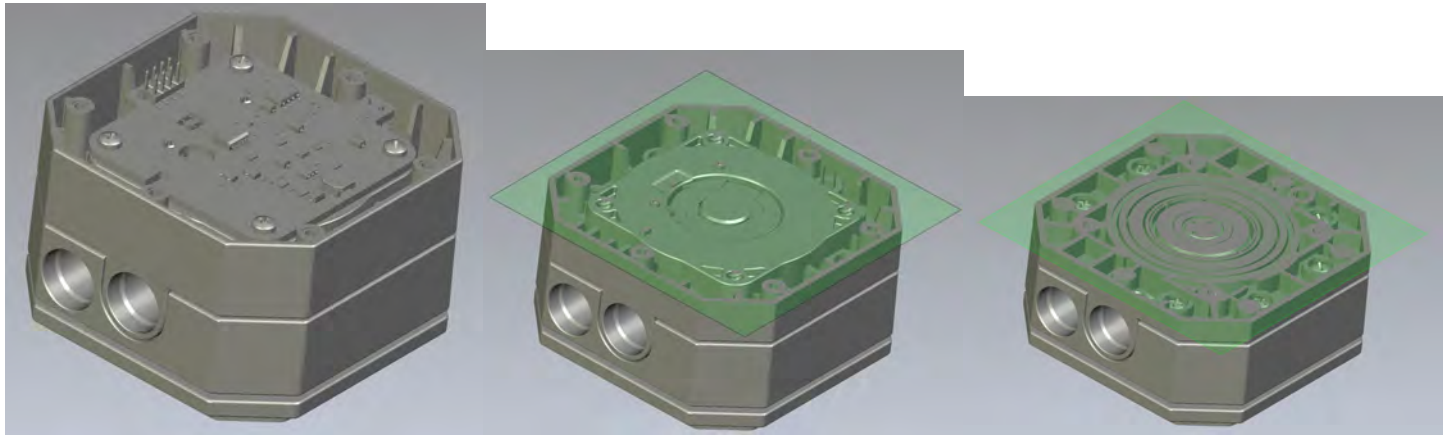
’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1. A heat exchange system comprising:	The New Design is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator (not shown) for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



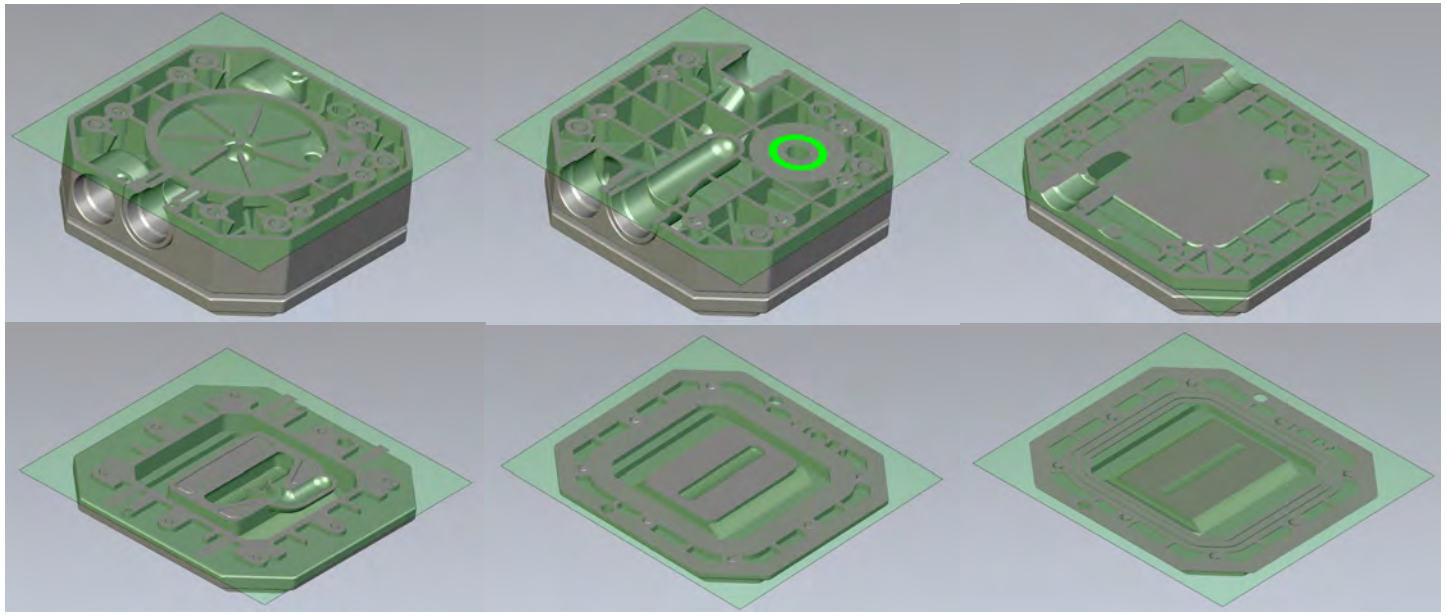
’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1. A heat exchange system comprising:	The New Design is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator (not shown) for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



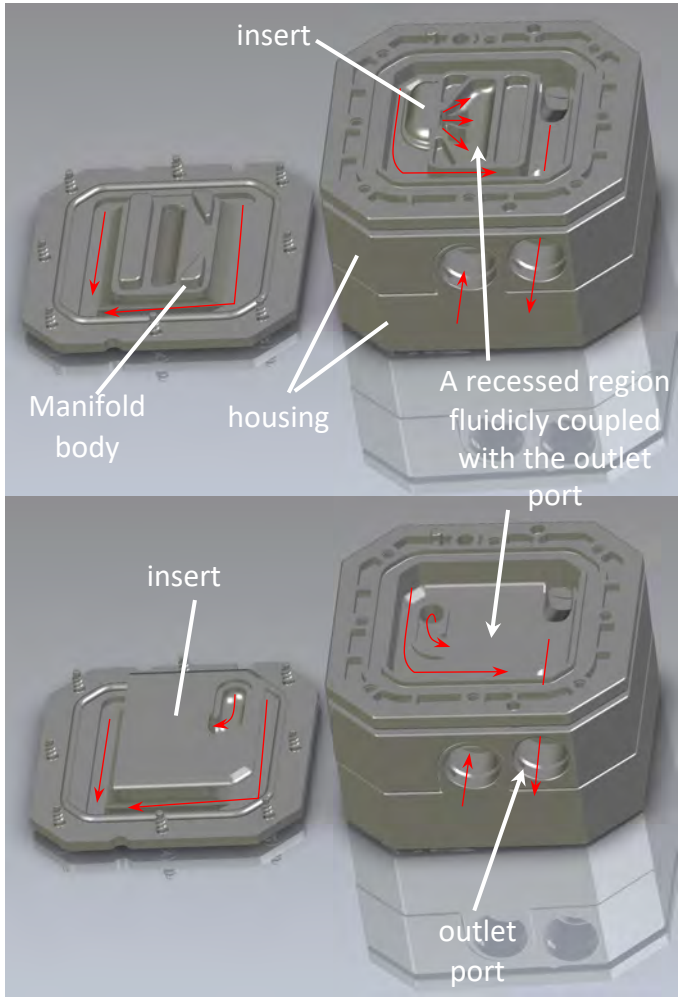
’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1. A heat exchange system comprising:	The New Design is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator (not shown) for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



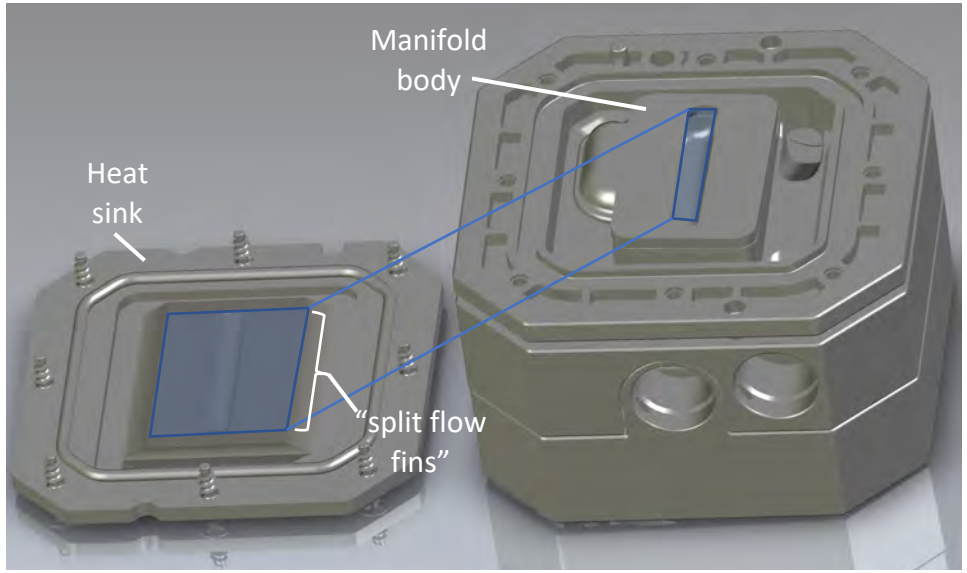
’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1[a]. a housing defining a recessed region and an outlet port fluidicly coupled with the recessed region;	The New Design device defines a recessed region and an outlet port fluidicly coupled with the recessed region. The images at top right and bottom right show the housing, together with an outlet port. In both images, the identified recessed region sits below and is set back from a perimeter of the identified recessed region. As shown at top right, the assembled housing defines such a recess. As shown at bottom right (e.g., when the housing insert shown at lower right is removed), the housing defines a deeper recess (blue shaded area at lower left). The insert at upper right (and lower left) rests within the recess shown at lower right. An outlet port defined by the housing (shown upper and lower right) receives coolant (indicated by red arrows) that flows through each of the above-identified recessed regions as the coolant passes through the New Design’s cold-plate module. Thus, regardless of which recessed region is selected, the outlet port is fluidicly coupled with the selected recessed region.



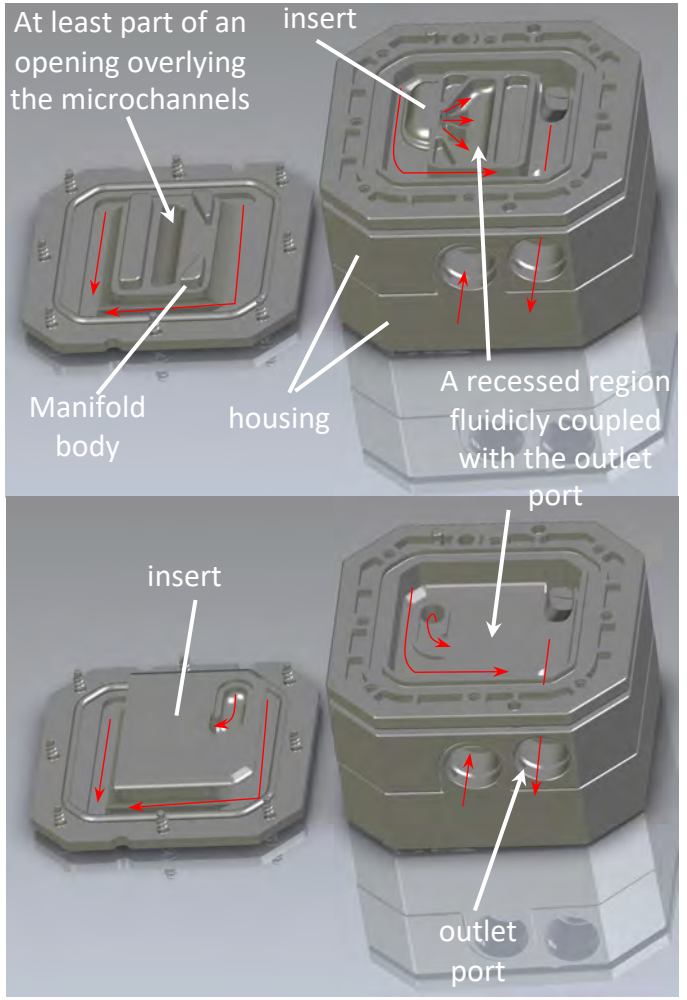
’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1[b]. a heat sink having a plurality of juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins;	The heat sink of the New Design device literally includes more than one fin, and this group of fins is spaced apart from each other without any intervening solid structure between them. And, the spacing between the fins define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the New Design satisfies the plurality of juxtaposed fins limitation. For example, the New Design device has a heat sink with a plurality of juxtaposed fins (e.g., each fin in the plurality of fins has no intervening solid structure between it and the next fin; right, shaded blue). The spacing between each pair of fins defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several spaced apart fins define a plurality of microchannels that correspond to the plurality of juxtaposed fins. As shown to the right, a group of juxtaposed fins and the corresponding plurality of microchannels are positioned beneath the opening (left, blue rectangle) in the manifold body. Each fin in this group is exposed directly to liquid flowing from the opening through the plate. These fins are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins.”



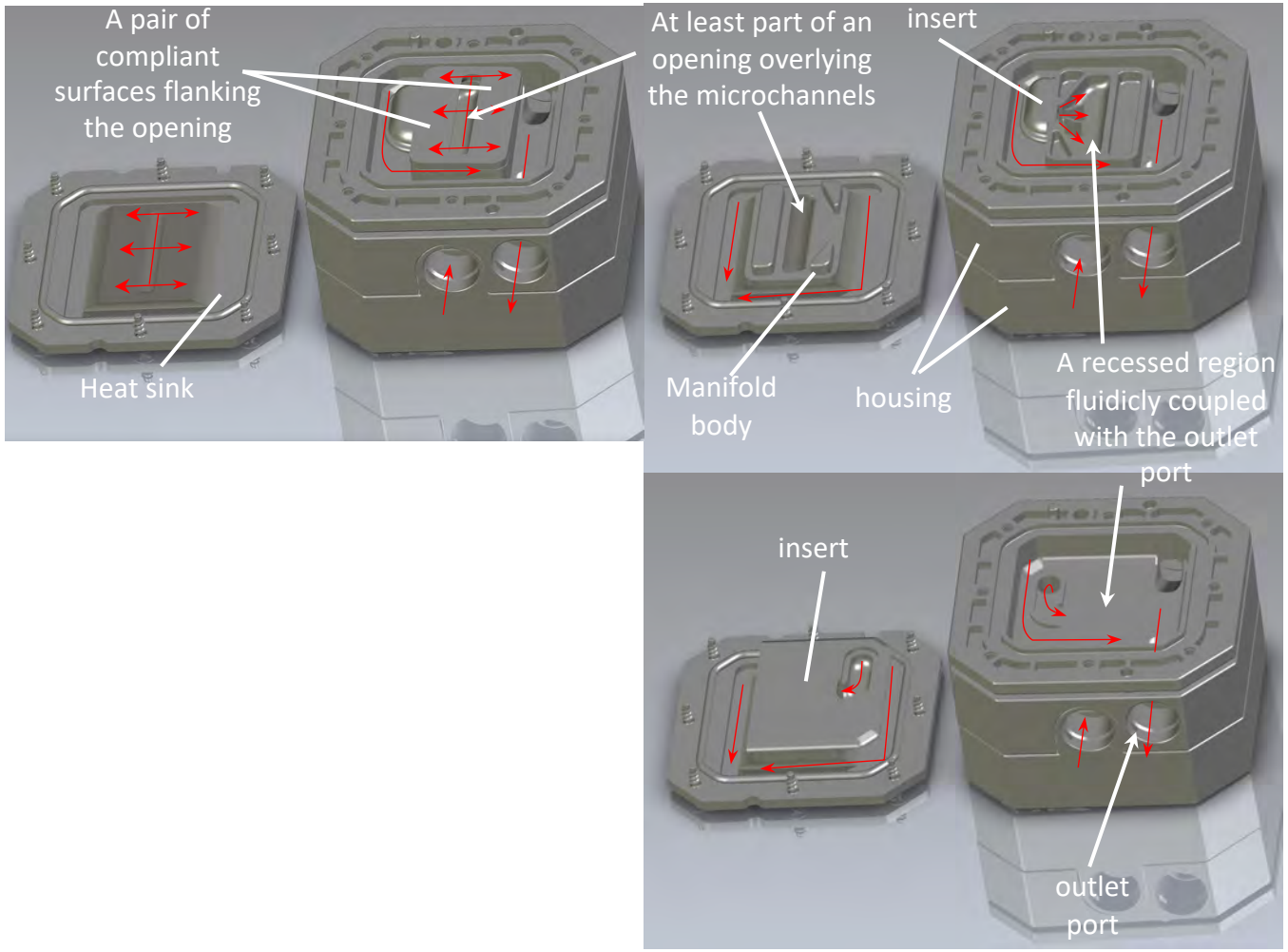
’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1[c]. a manifold body at least partially defining an opening overlying the microchannels,	As shown at upper left, the New Design device includes a manifold body that overlies the microchannels, regardless of which definition of “plurality of fins” is used. As shown at upper left, the manifold body defines at least part of an opening positioned over the microchannels. This is shown at lower right (note that the fins defining the microchannels are visible through the manifold body).



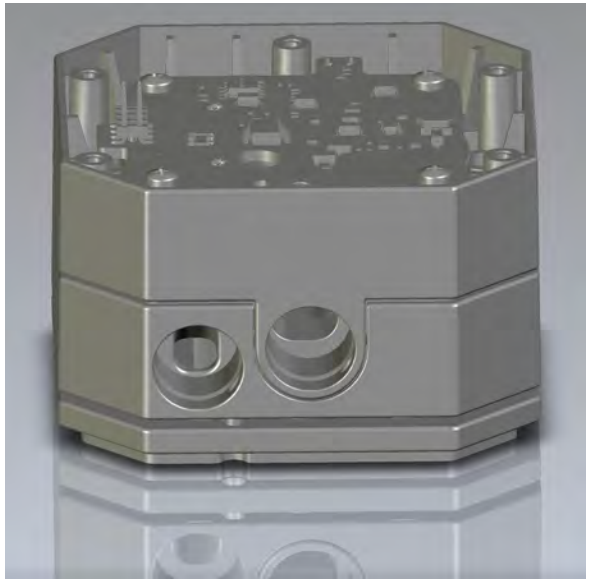
’266 Patent - Claim 1

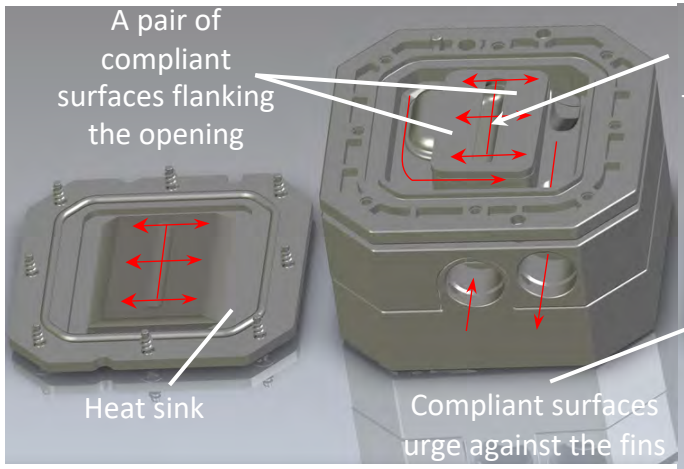
’266 Patent Claim	Comparison to New Design
1[d]. wherein the manifold body defines a pair of compliant surfaces flanking the opening,	At upper left, the New Design’s device’s pair of compliant surfaces made of a compliant polymer (e.g., rubber) are shown flanking the opening.

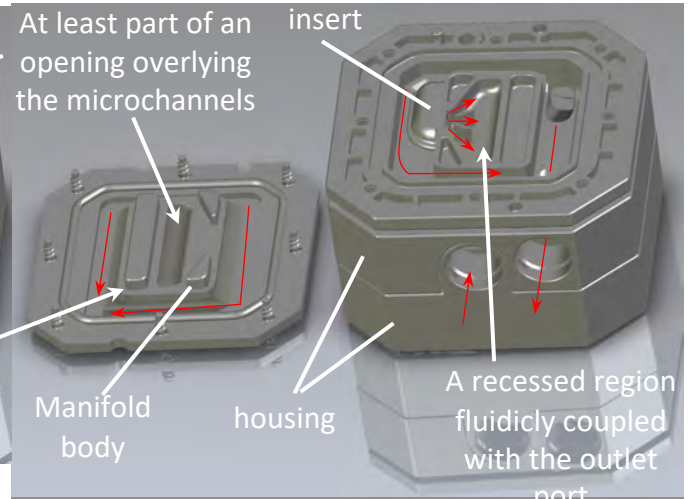


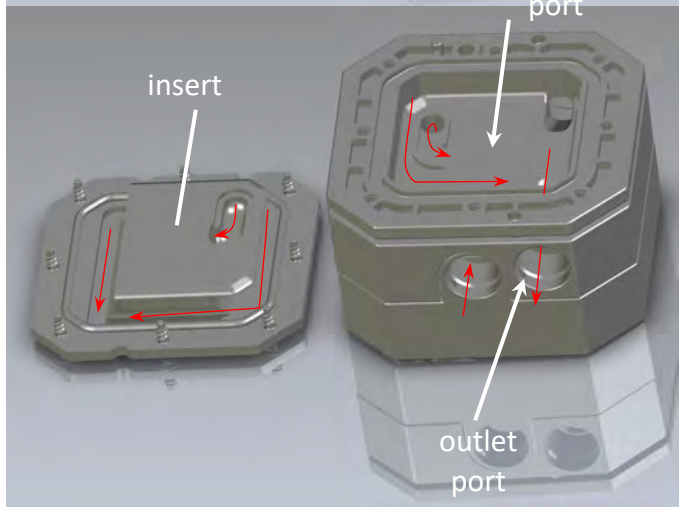
’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1[e]. wherein the compliant surfaces urge against the fins, defining a flow boundary of the microchannels,	When assembled as shown immediately below, the New Design’s cold-plate module compresses the manifold body (top left) between the heat sink and the housing, which urges the compliant surfaces against the fins and defines a flow boundary of the microchannels. The flow boundary inhibits coolant from leaking out of the microchannels, which would otherwise deteriorate cooling performance.



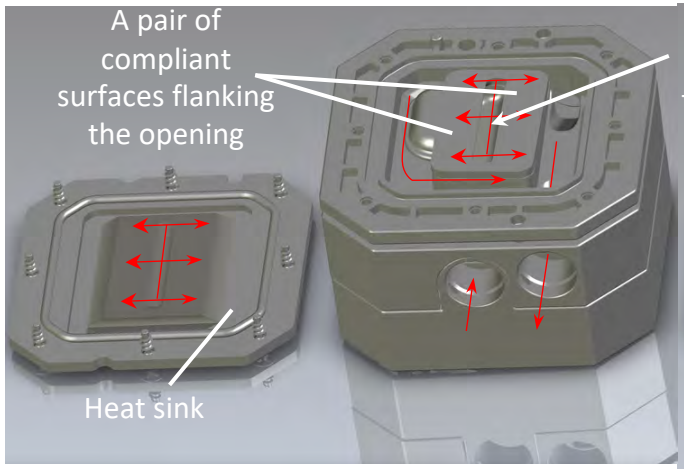


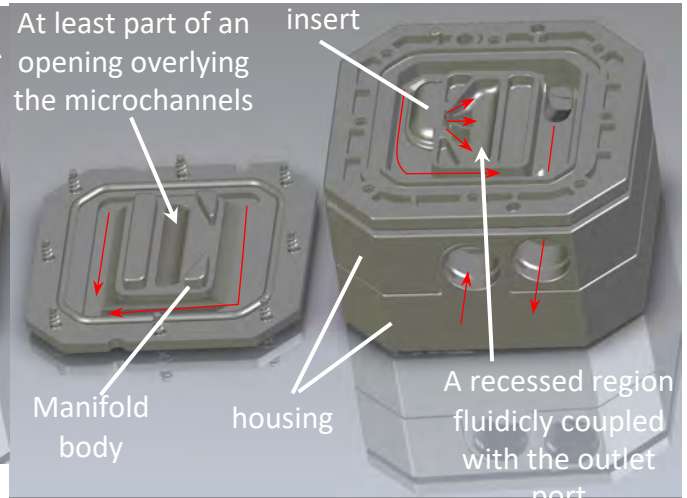


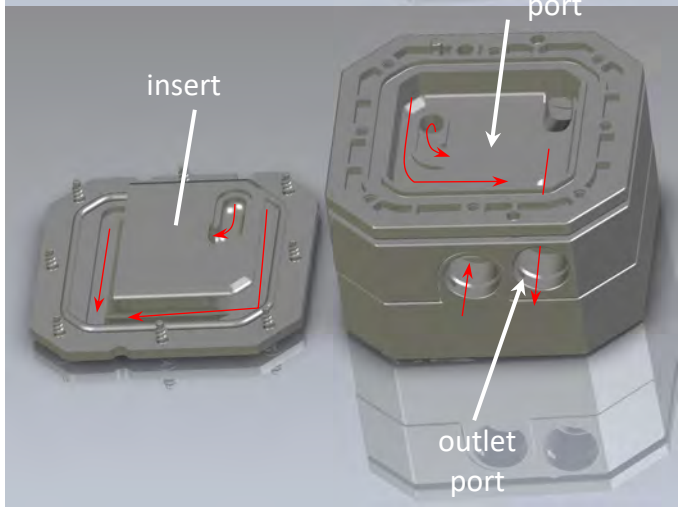


’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1[f]. wherein the opening extends transversely relative to the fins and is configured to distribute a working fluid among the microchannels,	As the upper left and the upper right images show, the opening extends transversely (e.g., across the tops of) the fins. The central red line (upper left and center left) lies within the opening (e.g., as a longitudinal axis of the opening) and is superimposed over the fins in the upper left image to indicate a flow of a working fluid being distributed among the microchannels.

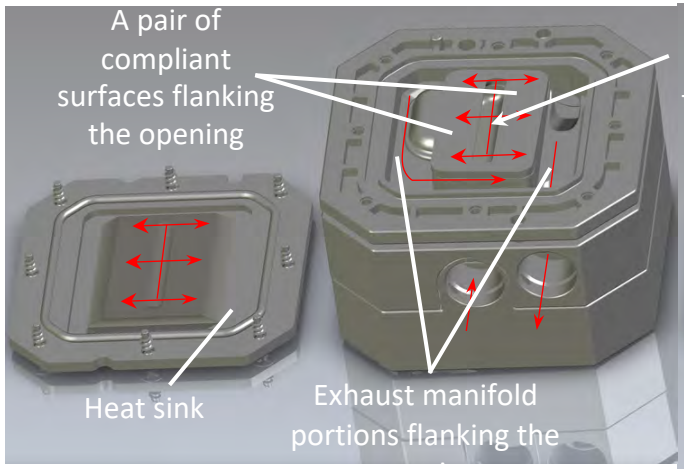


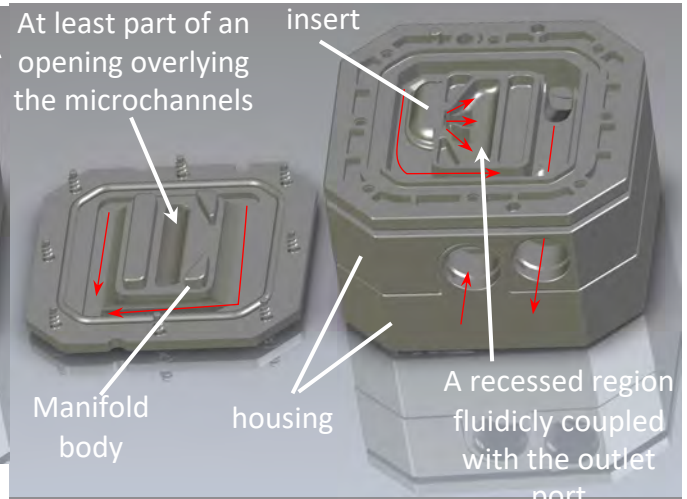


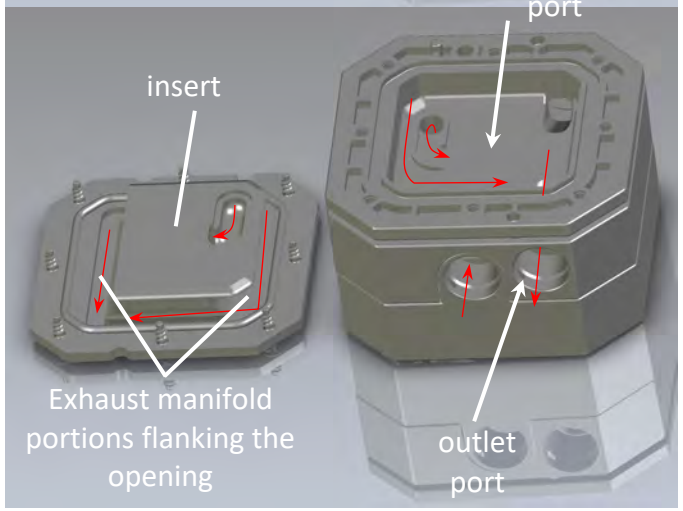


’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1[g]. wherein the manifold body partially occupies the recessed region of the housing, leaving a pair of opposed portions of the recessed region unfilled, defining opposed exhaust manifold portions flanking the opening and being configured to receive the working fluid from the microchannels, and	The the top, center-left image shows the manifold body positioned within and thus partially occupying the recessed region of the housing (e.g., shown at lower left and on prior slides), regardless of which recessed region defined by the housing is selected. In leaving a pair of opposed portions of the selected recessed region unfilled, the manifold body defines opposed exhaust manifold portions flanking the opening, as shown at upper left. The outwardly directed red arrows shown at upper left indicate a flow of the working fluid through the microchannels. The outwardly directed red arrows are superimposed on the image at upper right, showing that the outwardly directed flows of the working fluid through the microchannels enter the opposed exhaust manifold portions. Thus, the opposed exhaust manifold portions flanking the opening are configured to receive the working fluid from the microchannels, as claimed.

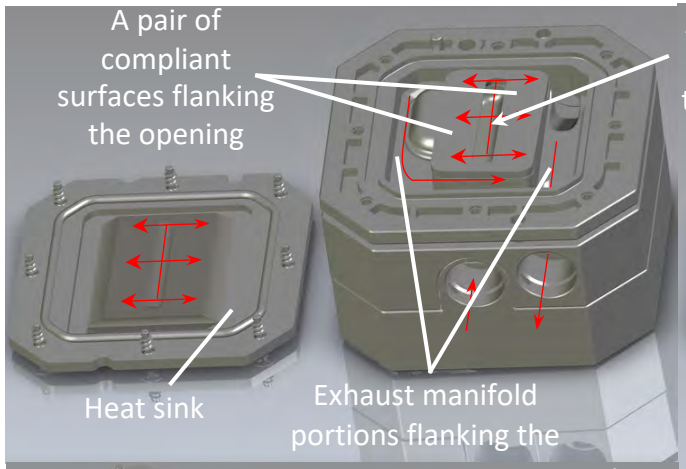


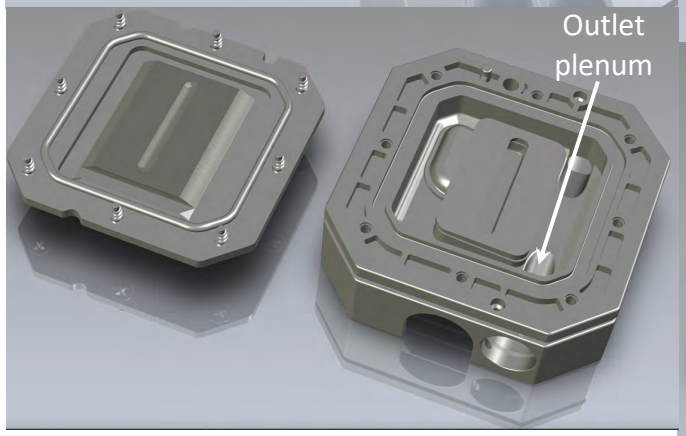


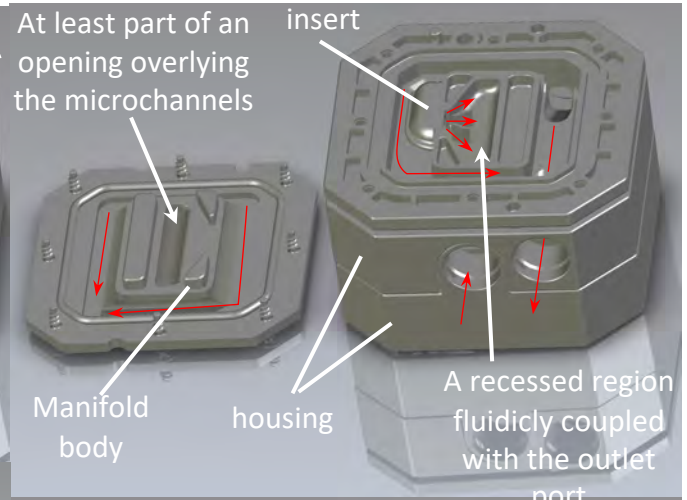


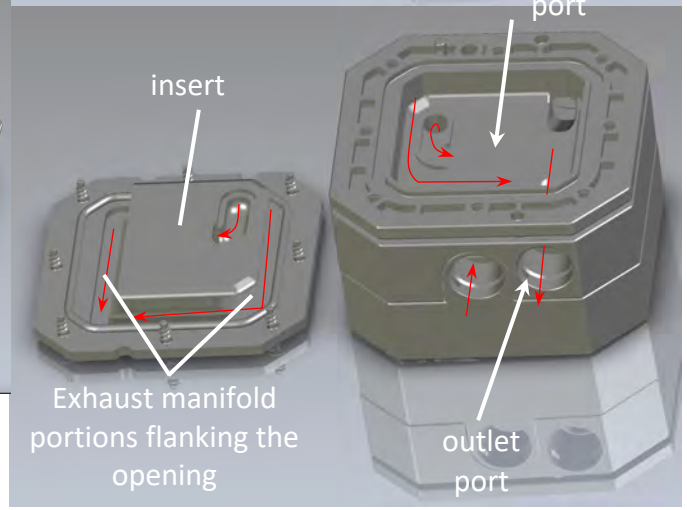
’266 Patent - Claim 1

’266 Patent Claim	Comparison to New Design
1[h]. wherein the housing further defines an outlet plenum configured to receive the working fluid from the exhaust manifold portions and to convey the working fluid to the outlet port.	The image at lower left shows an outlet plenum that receives the working fluid from the exhaust manifold portions. The outlet plenum conveys the working fluid to the outlet port.



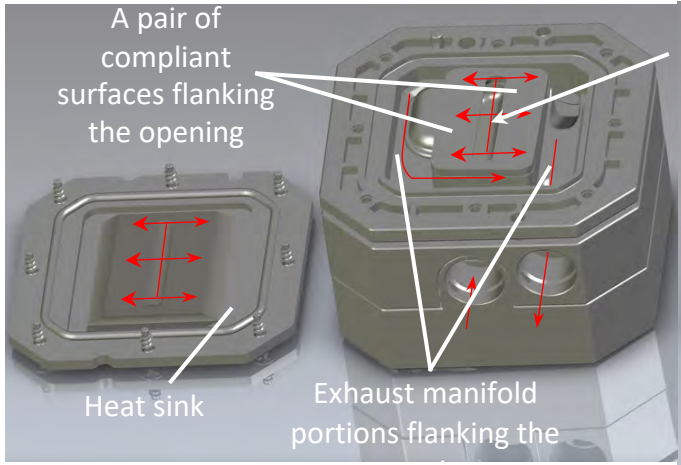


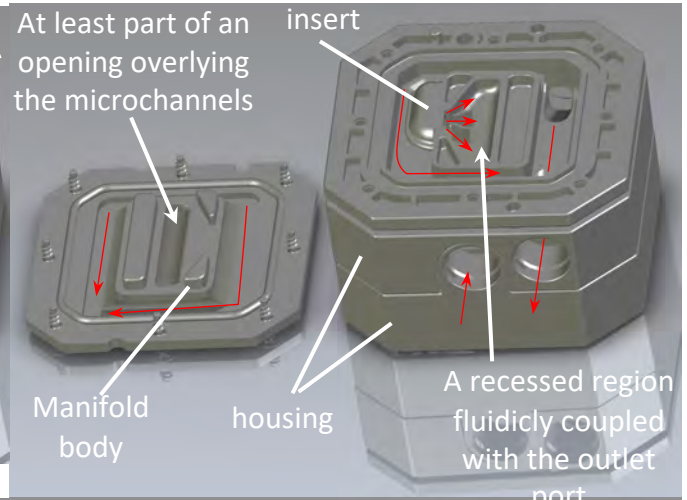


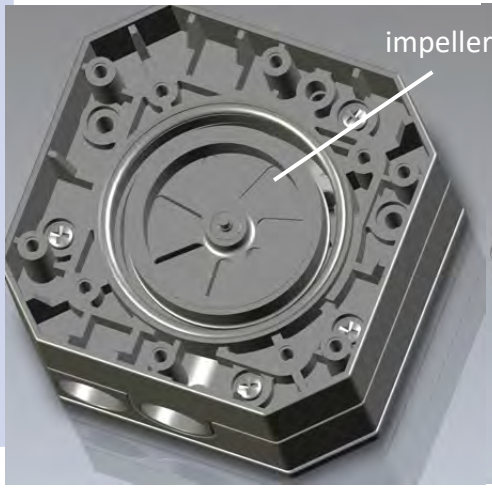


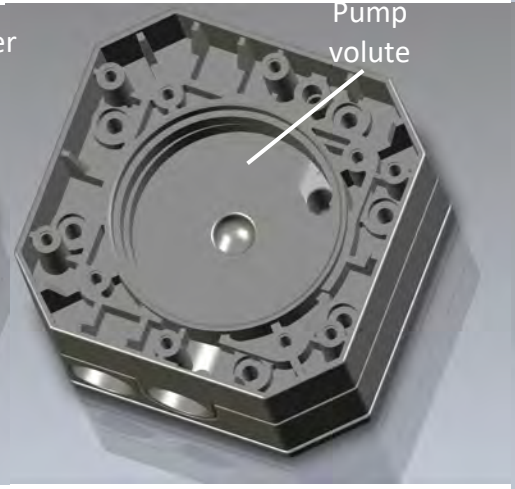
’266 Patent - Claim 2

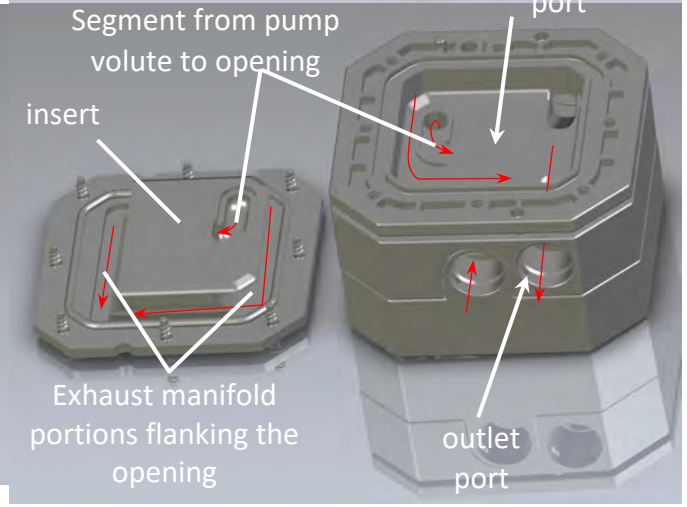
’266 Patent Claim	Comparison to New Design
2. The heat exchange system according to claim 1, wherein the housing defines a pump volute and a segment of a flow path, the segment configured to convey the working fluid from the pump volute to the opening at least partially defined by the manifold body, the heat exchange system further comprising an impeller positioned in the pump volute and configured to urge the working fluid along the flow path.	The lower right image shows the assembled housing defines a segment of a flow path configured to convey the working fluid from the pump volute to the opening defined in part by the manifold body. The lower left images show the housing defines a pump volute. At lower left, an impeller is shown positioned in the pump volute.





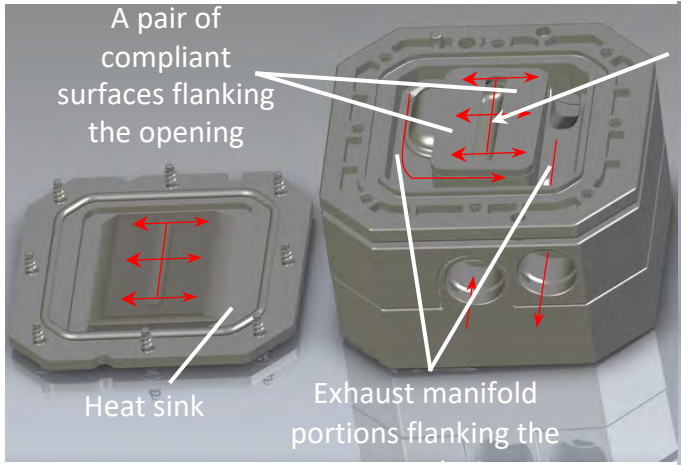


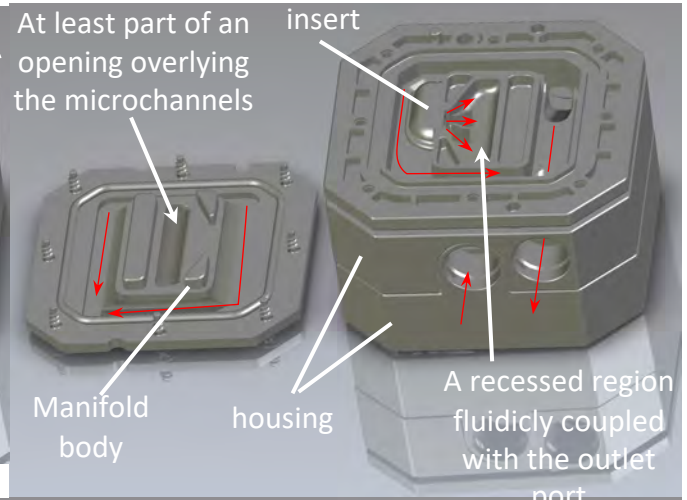


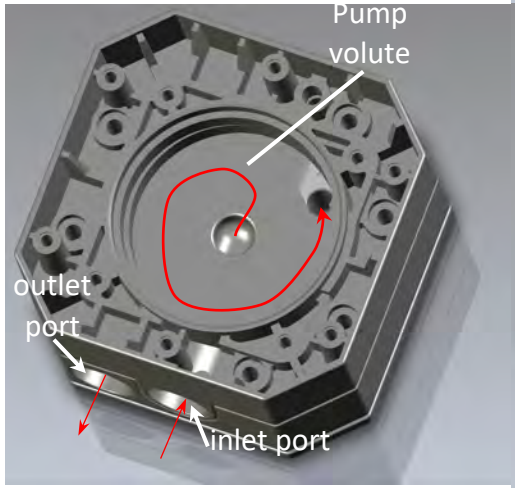


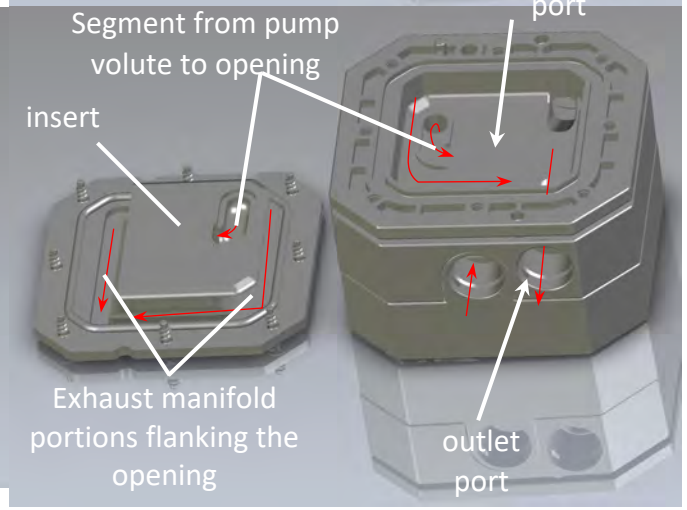
’266 Patent - Claim 5

’266 Patent Claim	Comparison to New Design
5. The heat exchange system according to claim 2, wherein the housing defines an inlet port, wherein the flow path extends from the inlet port to the outlet port and is configured to convey the working fluid from the inlet port through the pump volute, the manifold body, the microchannels, the opposed exhaust manifold portions, and the outlet plenum to the outlet port.	The lower left image shows an inlet port and the outlet port. The red arrows indicate the path that the working fluid follows through the cold-plate module of the New Design device. As indicated at lower left, the fluid enters from the inlet port and flows through a channel into an entrance to the pump volute. On entering the pump volute (lower left), the spinning impeller (not shown) imparts momentum to the working fluid, which exits the pump volute along the indicated segment of the flow path. Referring to the lower right image, the flow from the pump volute passes into the segment from the pump volute to the opening. At upper right, the flow path extends through the diffuser of the insert, through the manifold body (top center left and right) and enters the microchannels (upper right image). The opposed exhaust manifold portions (upper left image) collect the working fluid from the microchannels and the working fluid follows the flow path into the outlet plenum (curved red arrows in upper left), which conveys the working fluid to the outlet port (upper left).



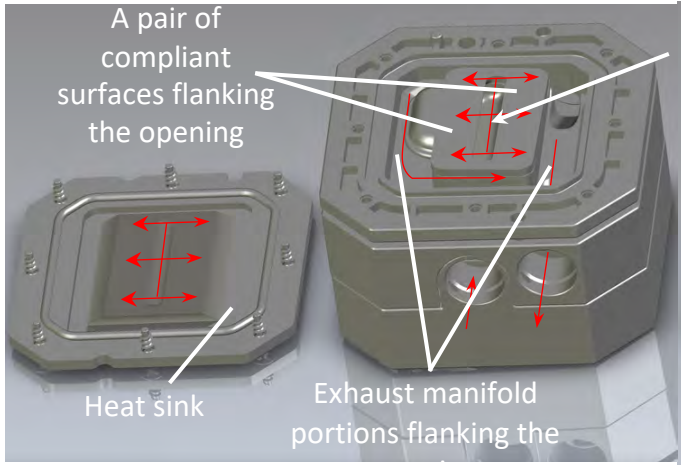


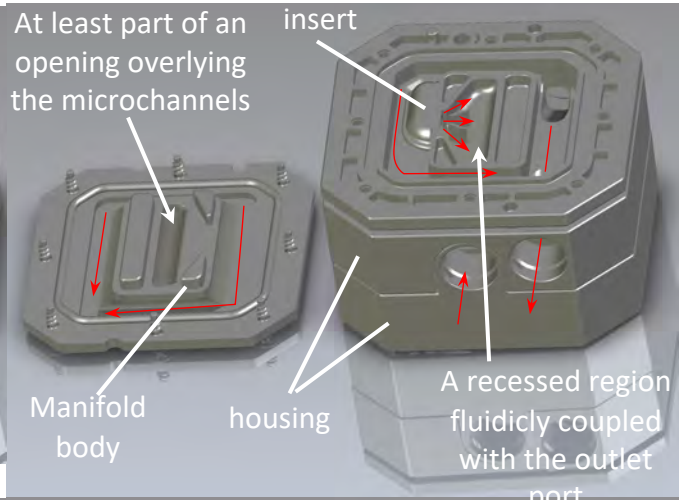


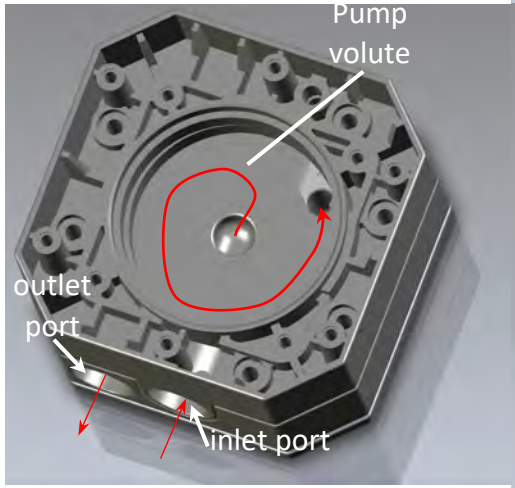


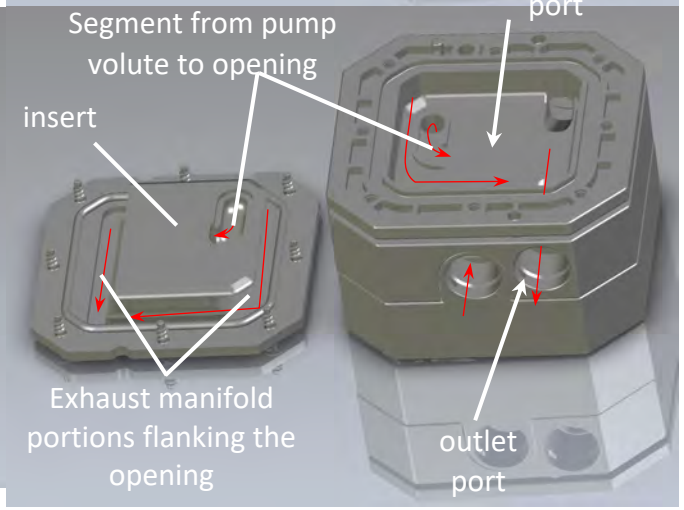
’266 Patent - Claim 9

’266 Patent Claim	Comparison to New Design
9. The heat-exchange module according to claim 1, wherein a flow of the working fluid defines a flow path, wherein the flow path is distributed among the plurality of microchannels, and, within each microchannel, the flow path bifurcates into a pair of opposed sub-flow paths directed away from each other.	Coolant flow through the New Design device defines a flow path. Red arrows superimposed on the images at right indicate the flow path. After exiting the pump, the coolant passes into the opening overlying the microchannels (indicated by central, outwardly fanning red arrows in upper right image) then into the microchannels. As the coolant flows over top the microchannels, the coolant flow (and thus the path the flow defines) is distributed among the plurality of microchannels, as indicated by the red arrows superimposed on the upper left image. The coolant flow enters each of the microchannels and, within each microchannel, splits (or bifurcates) into outwardly directed sub-flows (indicated by the outwardly directed red arrows superimposed on the upper left image). Thus, the coolant flow defines a flow path that bifurcates within each microchannel into a pair of opposed sub-flow paths directed away from each other, as claim 9 recites



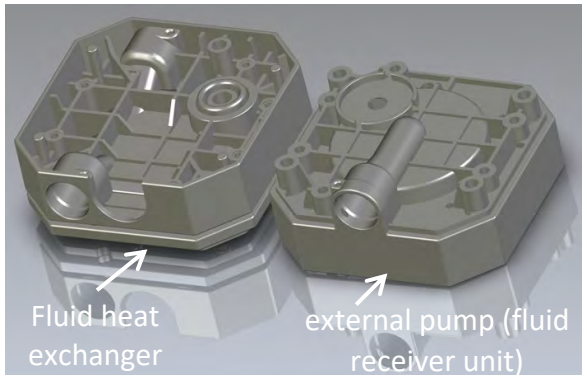


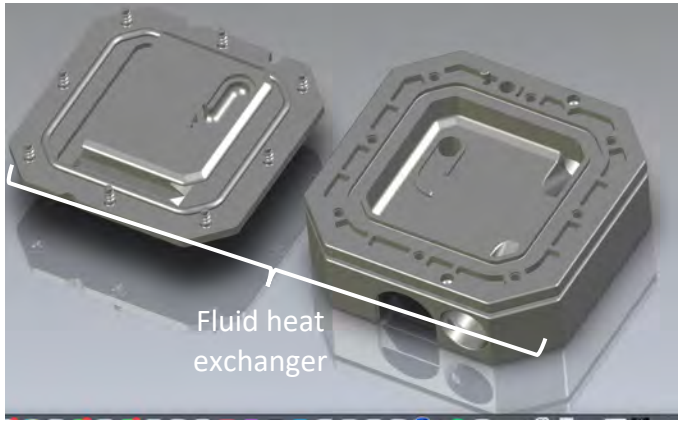


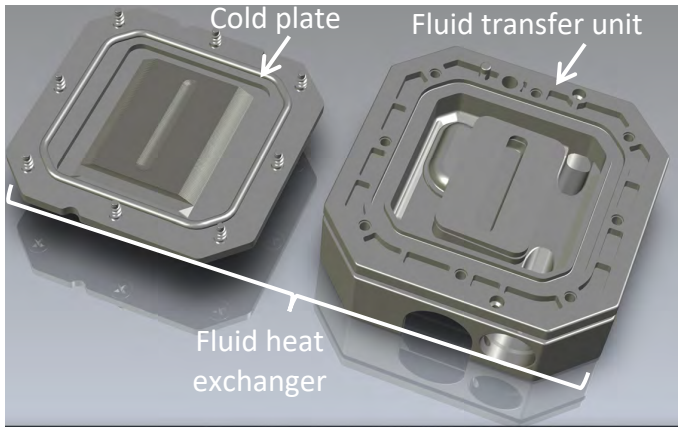


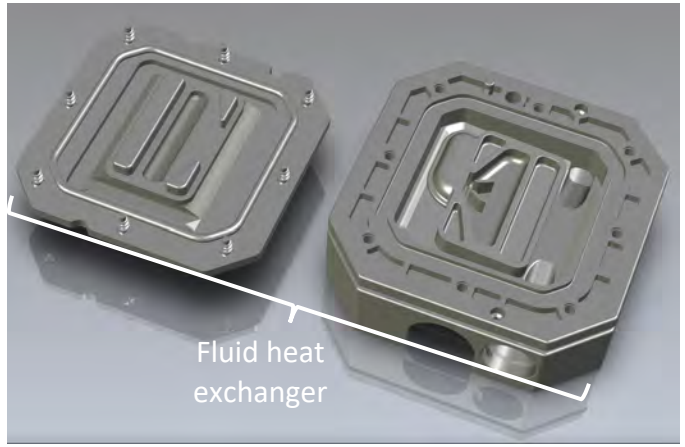
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The New Design is a modular heat-exchange system having a fluid receiver unit, a fluid transfer unit, and a cold plate coupled with the fluid transfer unit. In the embodiment shown, the fluid receiver unit includes a pump and is separable from the fluid transfer unit and the cold plate. The fluid transfer unit and the cold plate together form a fluid heat exchanger. For example, the assembled fluid transfer unit and cold plate includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the New Design device has a cold plate and a housing that are separable from the fluid receiver unit which contains the pump. Thus, the New Design device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component."



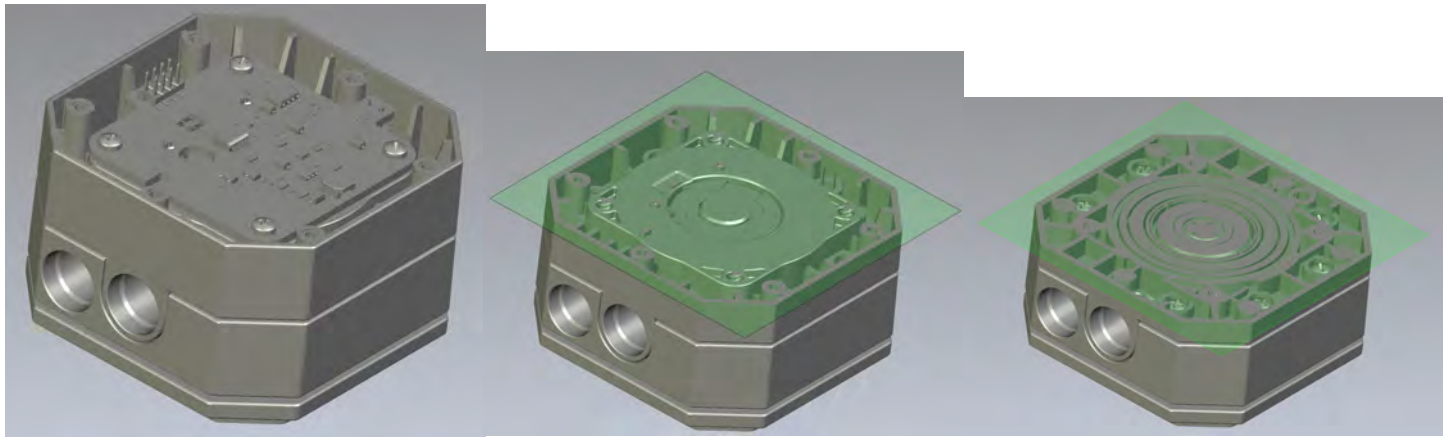






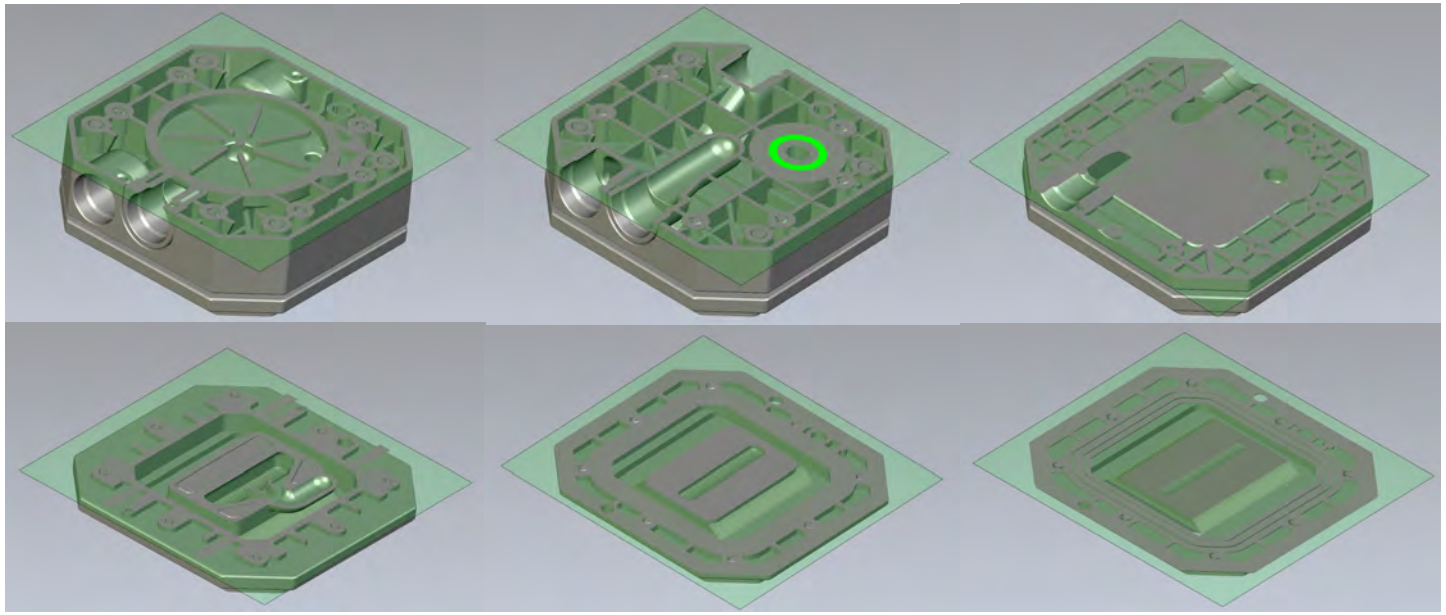
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The New Design is a modular heat-exchange system having a fluid receiver unit, a fluid transfer unit, and a cold plate coupled with the fluid transfer unit. In the embodiment shown, the fluid receiver unit includes a pump and is separable from the fluid transfer unit and the cold plate. The fluid transfer unit and the cold plate together form a fluid heat exchanger. For example, the assembled fluid transfer unit and cold plate includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the New Design device has a cold plate and a housing that are separable from the fluid receiver unit which contains the pump. Thus, the New Design device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component."



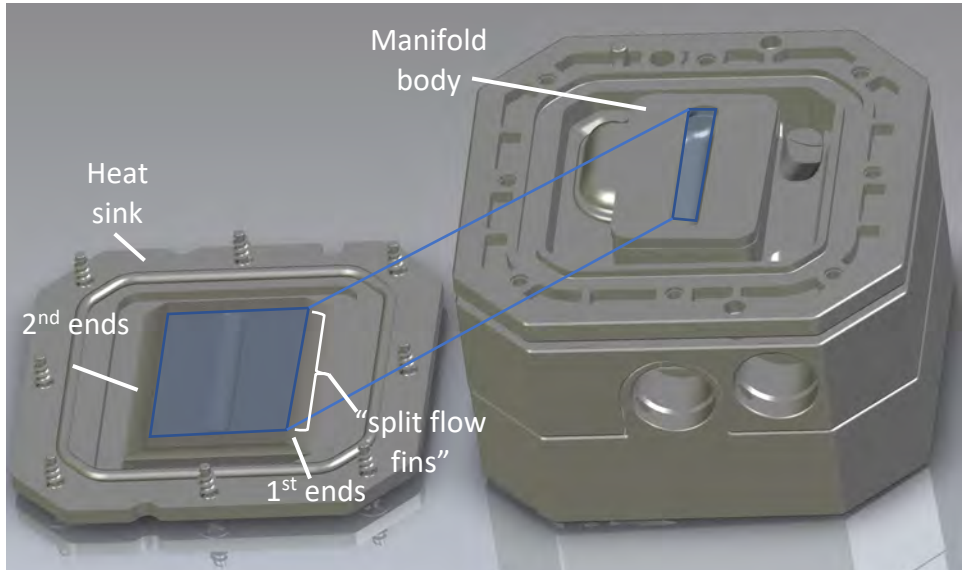
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The New Design is a modular heat-exchange system having a fluid receiver unit, a fluid transfer unit, and a cold plate coupled with the fluid transfer unit. In the embodiment shown, the fluid receiver unit includes a pump and is separable from the fluid transfer unit and the cold plate. The fluid transfer unit and the cold plate together form a fluid heat exchanger. For example, the assembled fluid transfer unit and cold plate includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the New Design device has a cold plate and a housing that are separable from the fluid receiver unit which contains the pump. Thus, the New Design device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component."



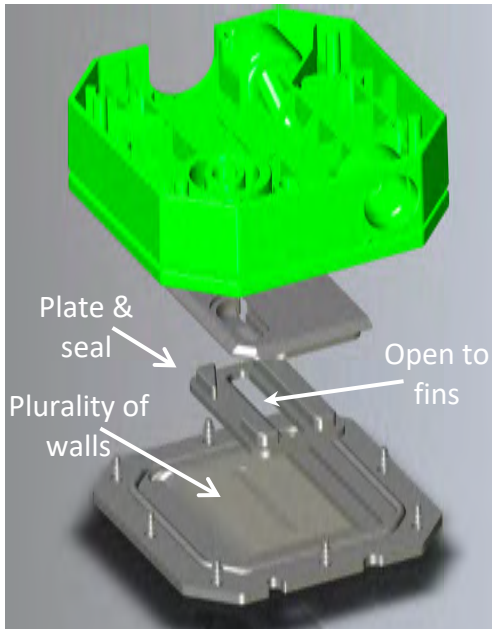
’266 Patent - Claim 13

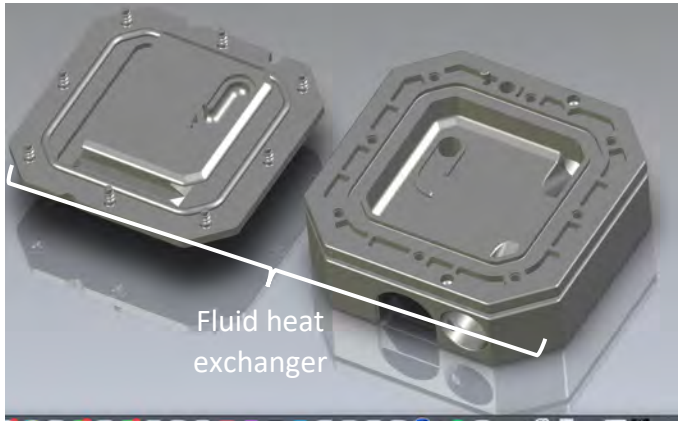
’266 Patent Claim	Comparison to New Design
13[a]. a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;	The New Design literally includes more than one wall, and this group of walls is spaced apart from each other, defining channels. And, the spacing between the walls define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the New Design satisfies the plurality of walls limitation. For example, the New Design has several spaced-apart walls (e.g., right, shaded blue). The spacing between each pair of walls defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several walls define a plurality of microchannels that correspond to the walls. As shown to the right, a group of walls and microchannels (left) is positioned beneath the opening (right) in the plate. Each wall in this group is exposed directly to liquid flowing from the opening through the plate. These walls are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “plurality of walls.” Each microchannel extends from a first end to a second end.

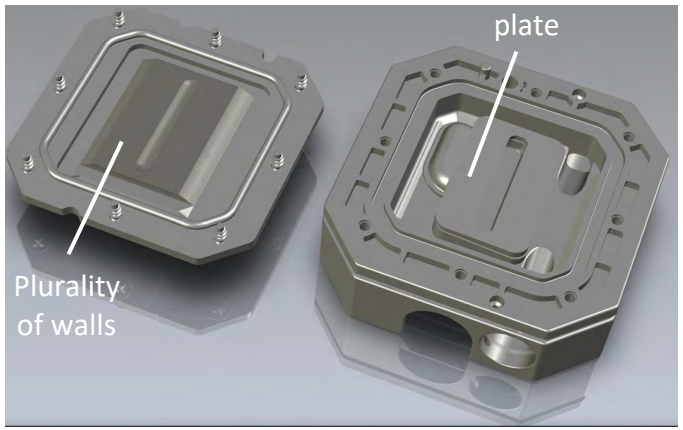


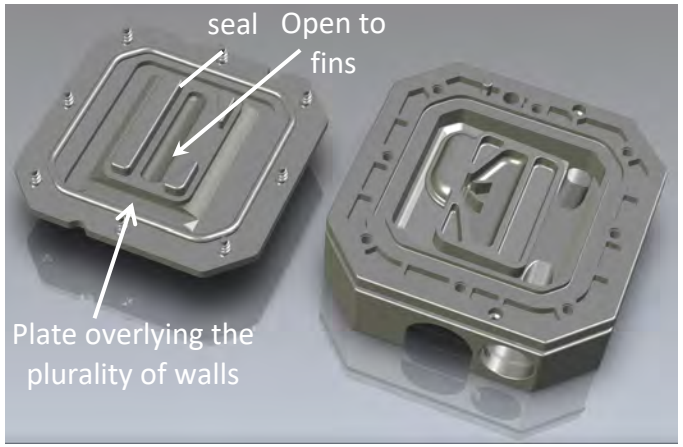
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13[b]. a plate overlying the walls; and a seal, wherein the seal is a portion of the plate;	The top left image shows a plate that overlies the plurality of walls, whether the plurality of walls is identified as the “split-flow fins” or another selected group of fins containing more than one fin. The lower right image shows the plate overlying the fins, as well as the seal being a separately identifiable structure that is formed as a unitary construct with the plate (upper left image). Thus, the seal constitutes a portion of the plate as claimed. See, ’266, col. 12:43-44 (“Seal 230 may be installed as a portion of the plate or separately.”); FIGS. 5 and 6 (illustrating the seal 230 as being structure that is continuous and monolithic with the plate 240 and tabs 242).



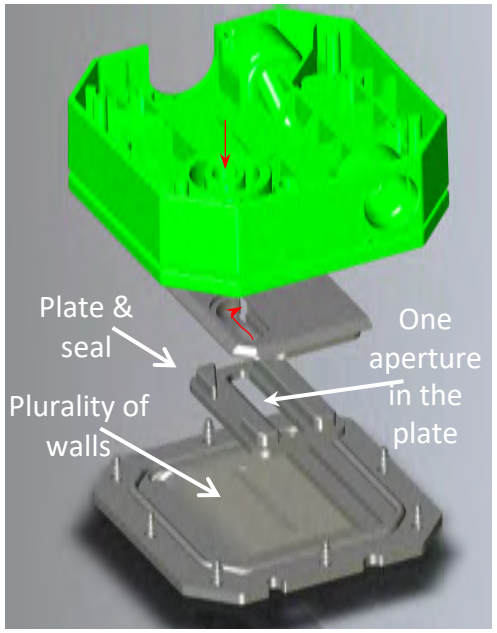


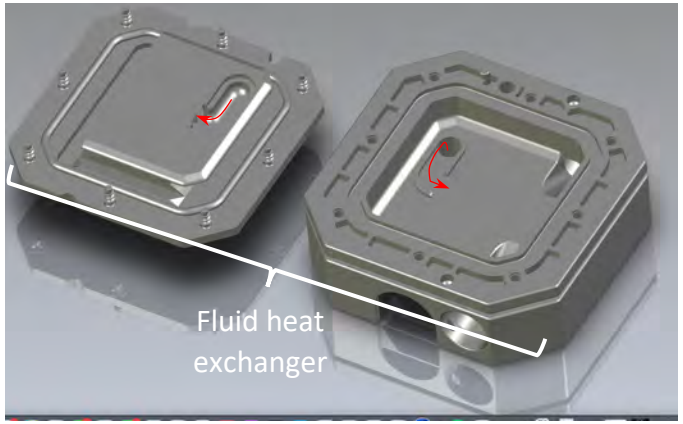


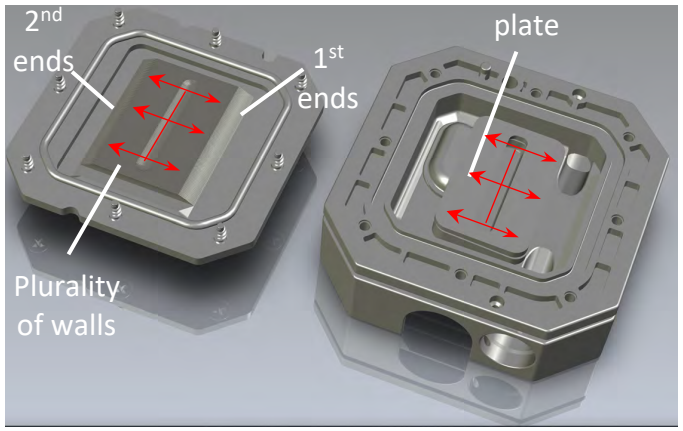


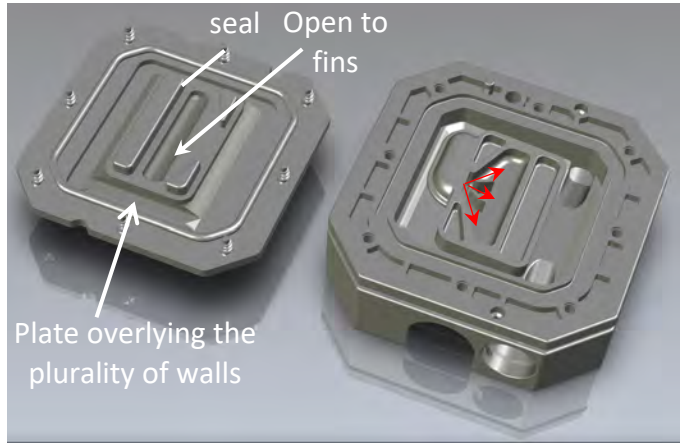
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13[c]. a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;	The red arrows superimposed on images to the right depict the fluid inlet passage by showing segments of the continuous passage from the inlet port through various components and ultimately to the opening into the microchannels. Although not a portion of the inlet passage, flow through the microchannels is indicated by the outwardly extending red arrows in the lower left image. The upper left image, the lower right image and the lower left image show a portion of the fluid inlet passage that delivers coolant through one aperture in the plate to each microchannel (indicated by red line extending longitudinally of the aperture in the plate). The fluid inlet passage delivers the heat-exchange fluid to each microchannel at a position between the first and second end of each respective microchannel (indicated by outwardly extending arrows in the lower left image).



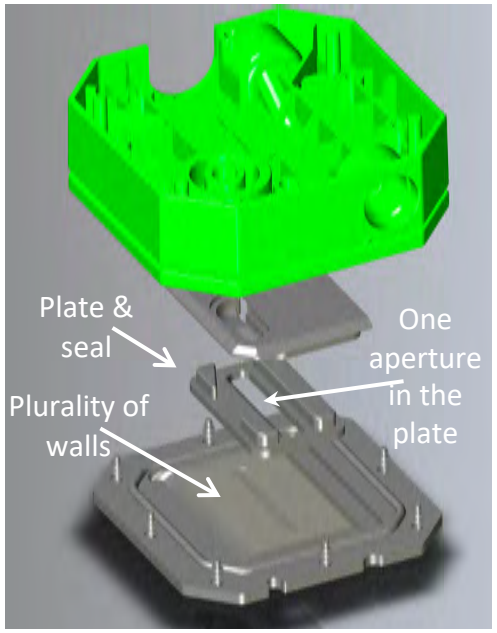


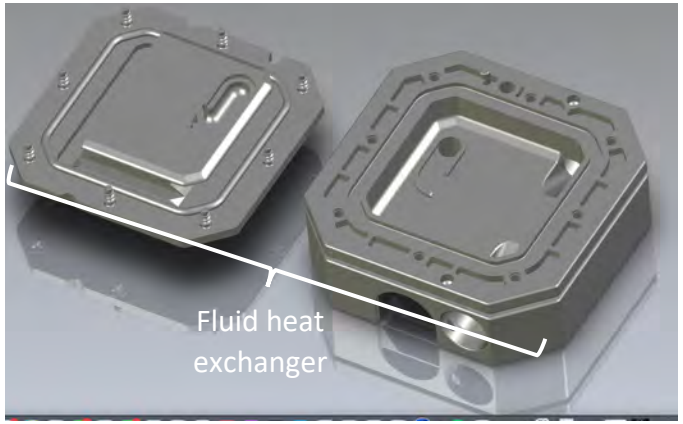


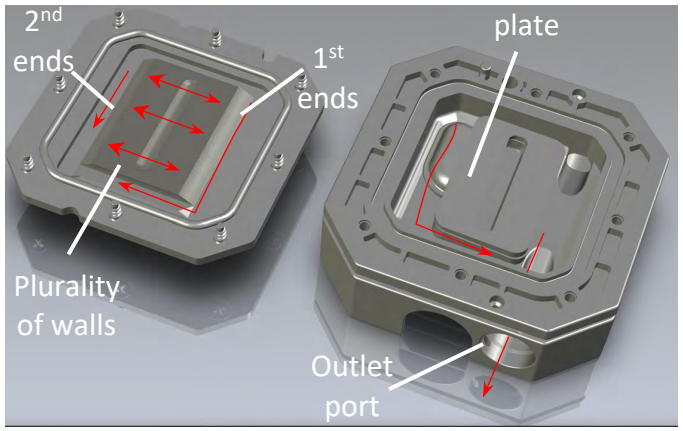


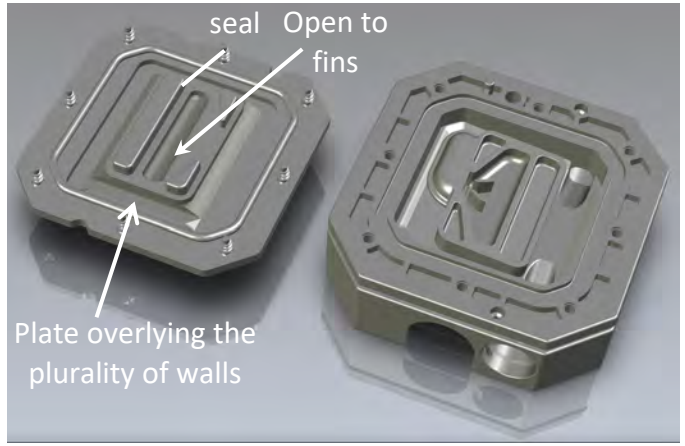
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13[d]. a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel,	The image at lower left shows a fluid outlet passage (indicated by red arrows) configured to receive the heat exchange fluid from the first end and the second end of each microchannel. As the red arrows on the previously slide indicate, the coolant enters the microchannels and bifurcates into two sub flows: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage (indicated by the red arrows at lower left) receives the coolant from both ends of each microchannel and delivers the coolant to the outlet port (lower left).



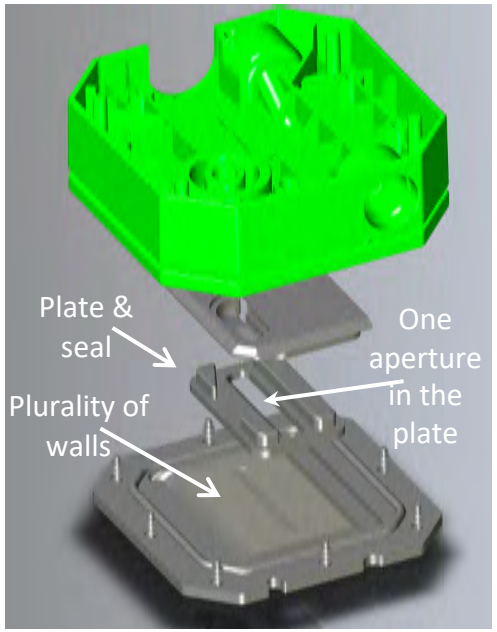


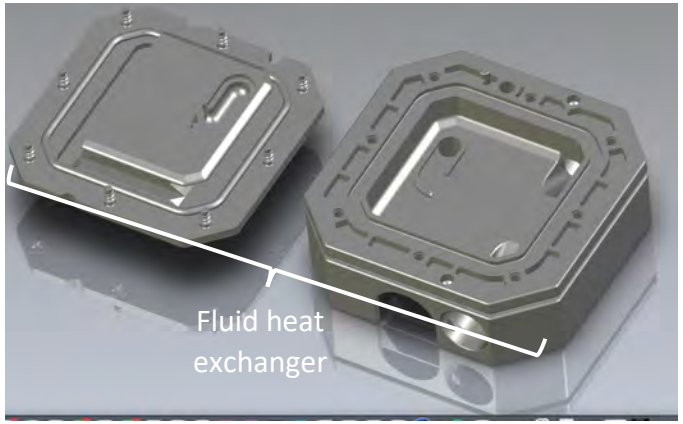


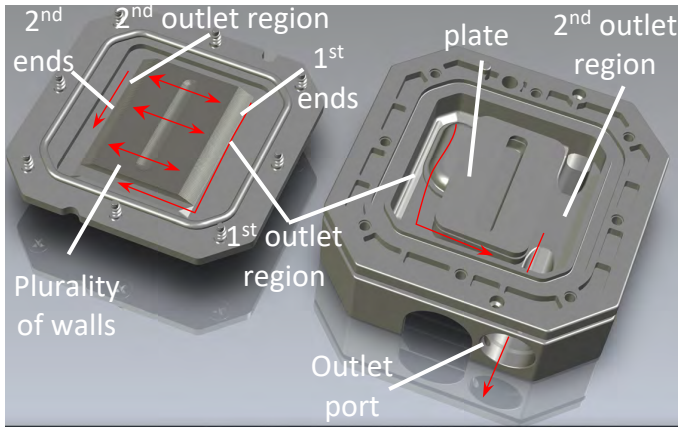


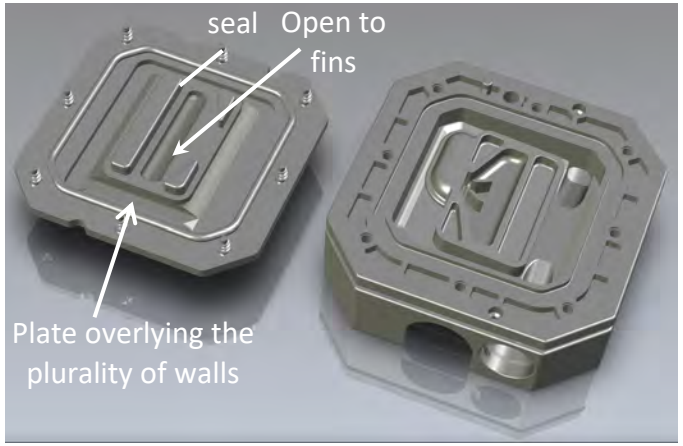
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13[d][1]. wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends,	The lower left image shows that the fluid outlet passage has a first outlet region positioned with no intervening solid structure between it and the microchannel first ends and a second outlet region positioned with no intervening solid structure between it and the microchannel second ends.



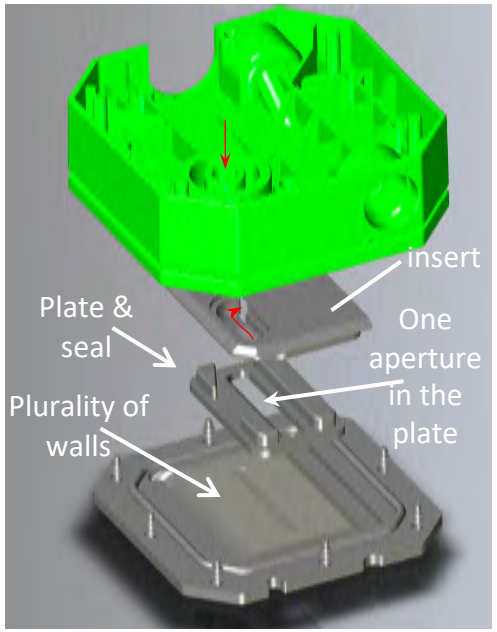


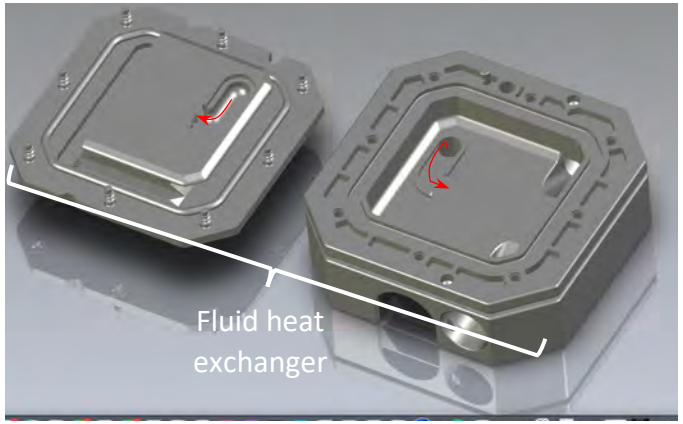


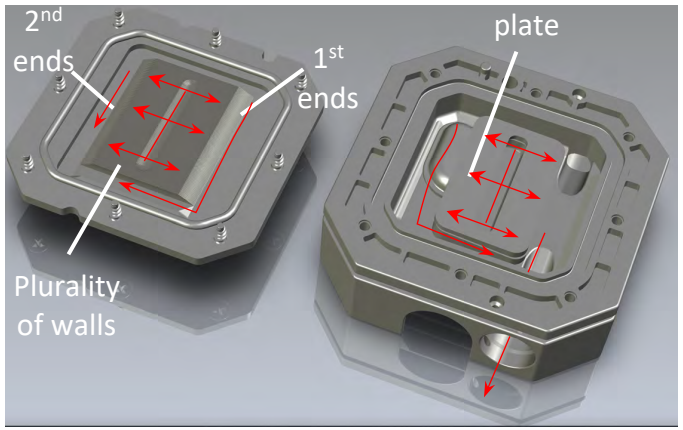


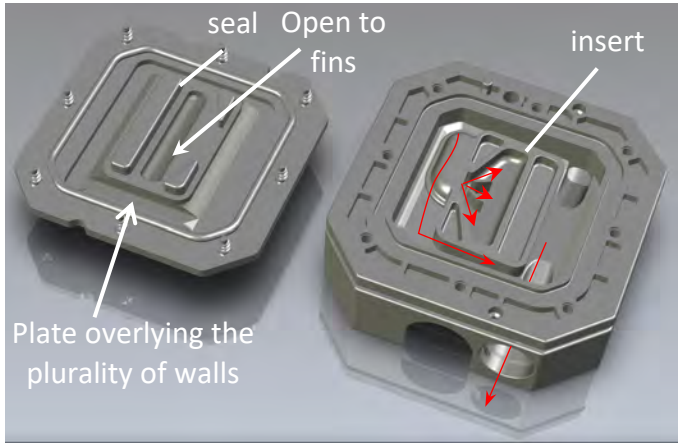
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13[d][2]. wherein the seal separates the fluid inlet passage from the fluid outlet passage;	The image at lower right shows that the seal separates the inlet passage from the outlet passage. Because of the seal’s position and fluid-tight engagement with the housing insert, coolant must flow through the microchannels as indicated by the red arrows (upper right image) before reaching the outlet passage, rather than short circuiting and bypassing the microchannels by flowing directly from the inlet passage to the outlet passage.



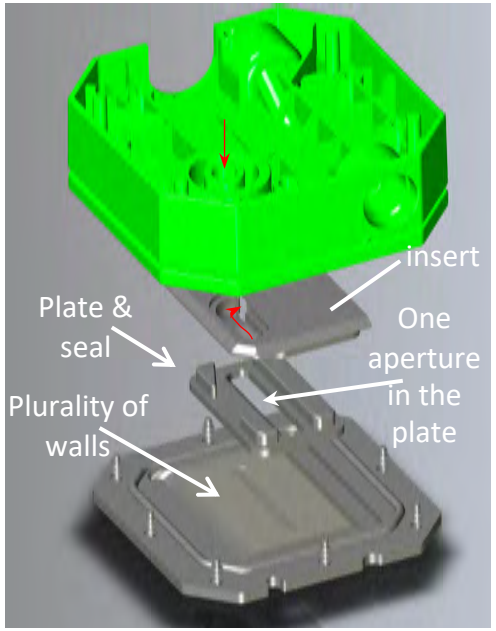


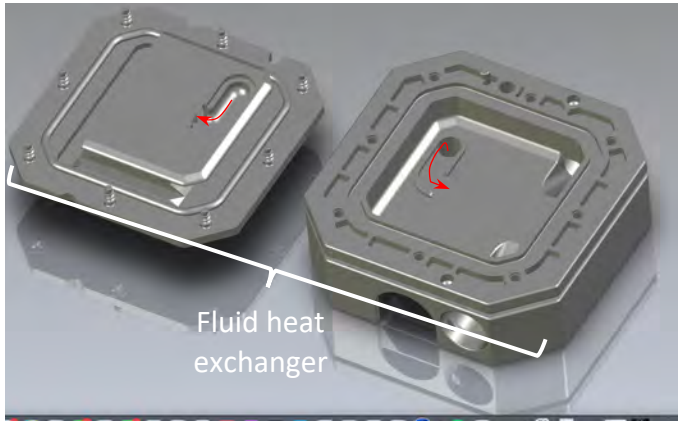


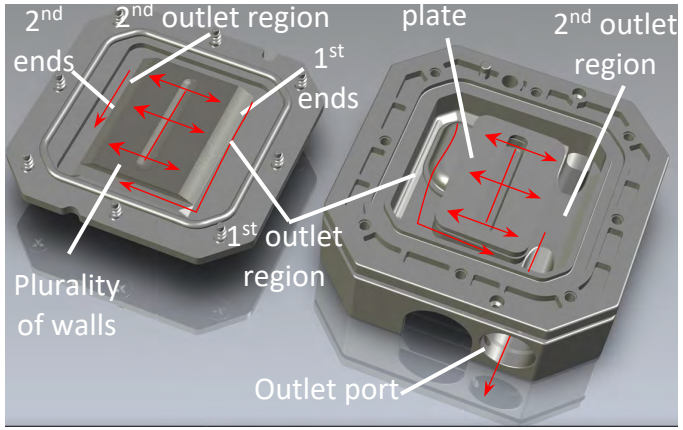


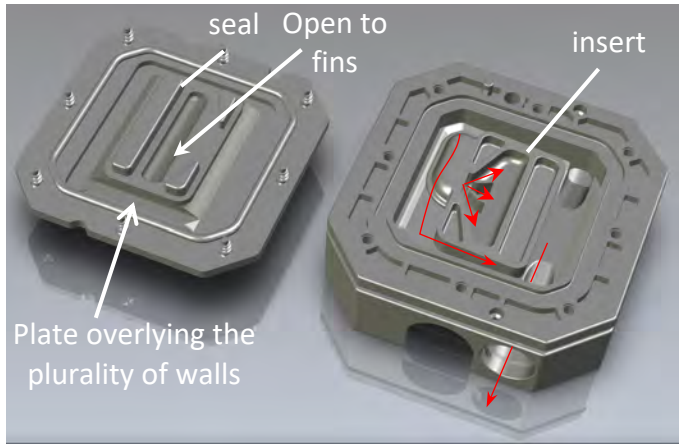
’266 Patent - Claim 13

’266 Patent Claim	Comparison to New Design
13[d][3]. wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel,	As the red arrows in the lower left image indicate, the coolant enters each of the selected ”plurality of microchannels” and bifurcates into two sub flows within each microchannel: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.
13[d][4]. wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends,	As indicated in the upper left image, the first outlet region receives one of the two sub flows (outwardly facing red arrows at lower left) with no intervening solid structure between it and the microchannel first ends. Similarly, as shown in the lower left image, the second outlet region receives the other of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel second ends.
13[d][5]. wherein the two sub flows recombine in the outlet passage.	As indicated in the lower left image, the two sub flows recombine in the outlet passage, e.g., near the outlet port, similar to a disclosed embodiment in the ’266 patent. See, e.g., ’266 patent, FIG. 2 (showing that the sub flows recombine near the outlet port 128).



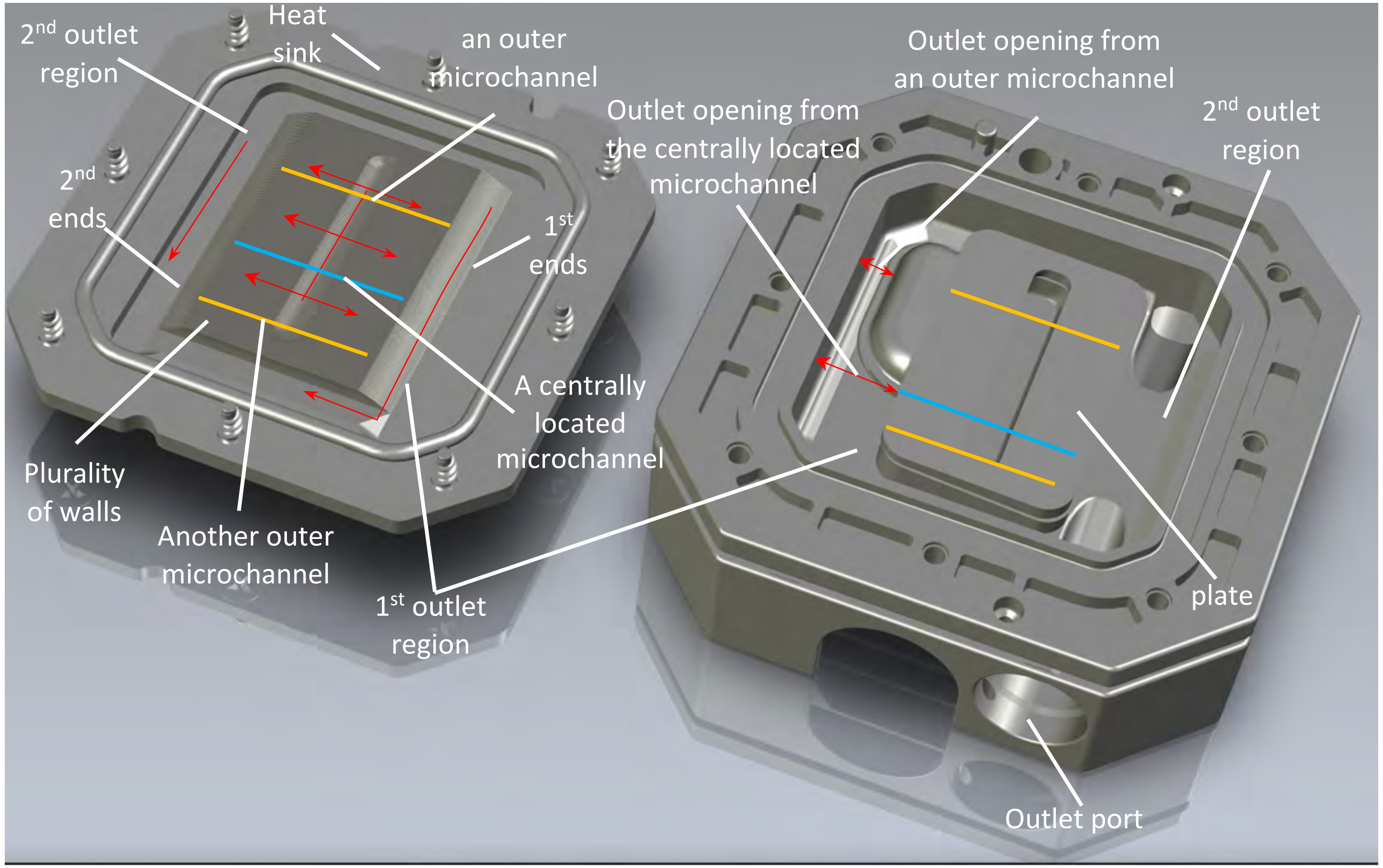






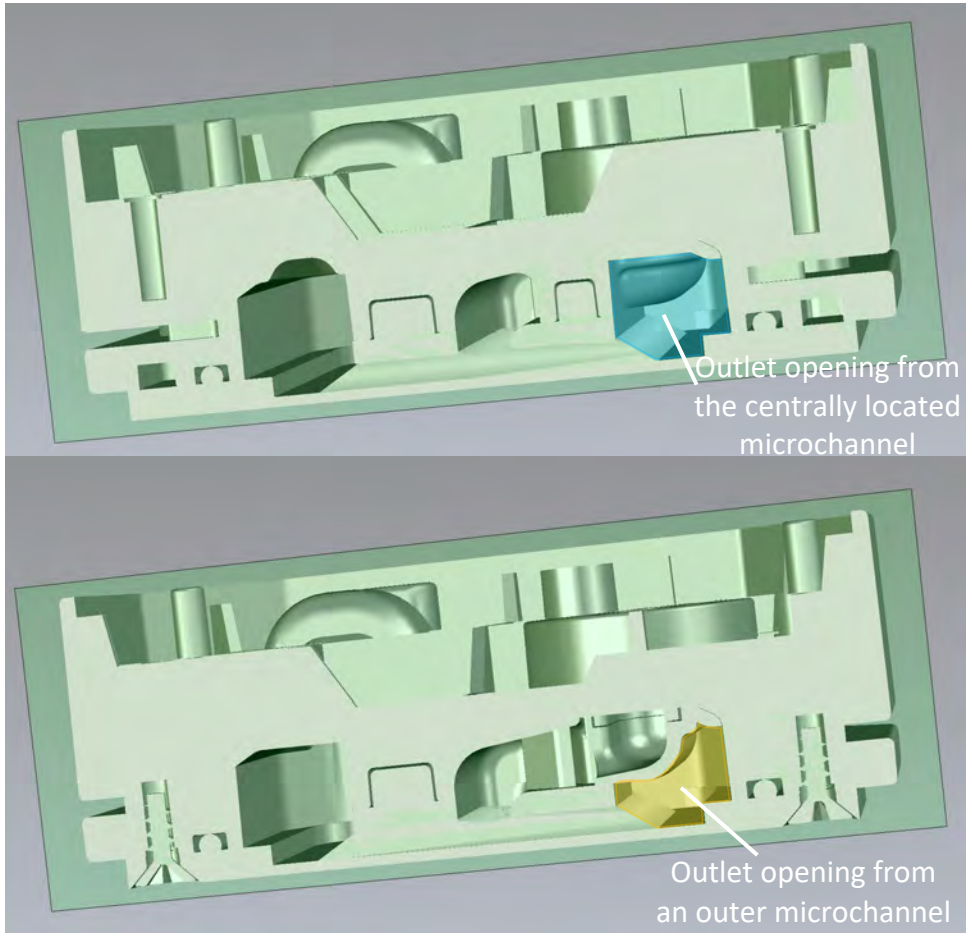
’266 Patent - Claim 15

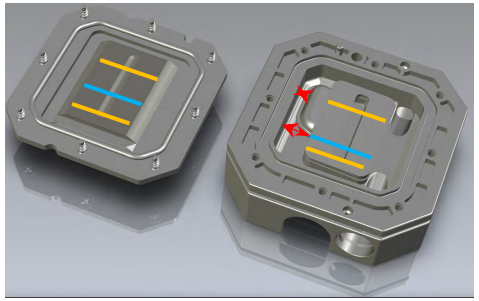
’266 Patent Claim	Comparison to New Design
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	The left image shows that the New Design includes at least two opposed outer microchannels (orange lines) and a centrally located microchannel (blue line) positioned between the opposed outer microchannels. (This is true regardless of whether the microchannels arise from the "split flow fins" or some other selected group of fins.) As well, each microchannel has an outlet opening to the first outlet region. As indicated by the red arrows superimposed on the right image, the outlet opening from the identified centrally located microchannel is larger than the outlet opening from at least one of the identified outer microchannels. [continued on next page]



’266 Patent - Claim 15

’266 Patent Claim	Comparison to New Design
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	The top left image and the bottom left image are cross-sectional views of the New Design taken parallel the identified centrally located microchannel and the “at least one of the outer microchannels” identified on the previous page. The blue shaded area in the top left image shows the outlet opening from the centrally located microchannel. The orange shaded area in the bottom left image shows the outlet opening from the identified “at least one of the outer microchannels.” At right, a comparison of the areas of the outlet openings is shown. In the middle right image, the areas of the outlet openings are superimposed on each other. The image at lower right shows the area of the outlet opening from the centrally located microchannel that remains when the area of the opening from the outer microchannel is subtracted or removed. In other words, the lower right image shows that the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.





Comparison of outlet openings from the centrally located microchannel and at least one outer microchannel

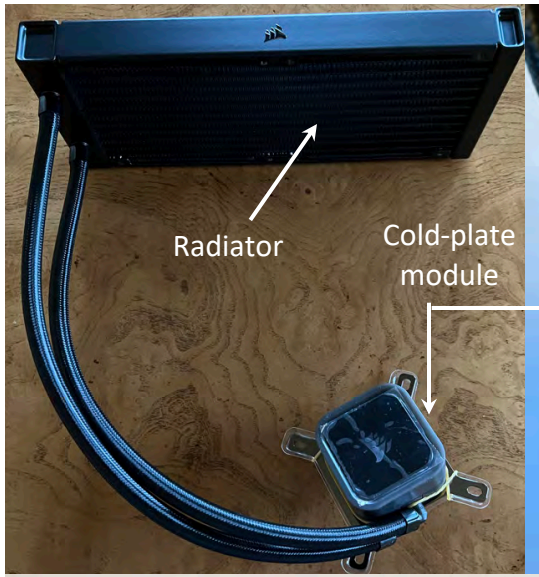
The area by which the outlet opening from the centrally located microchannel is larger than the outlet opening from the identified outer microchannel

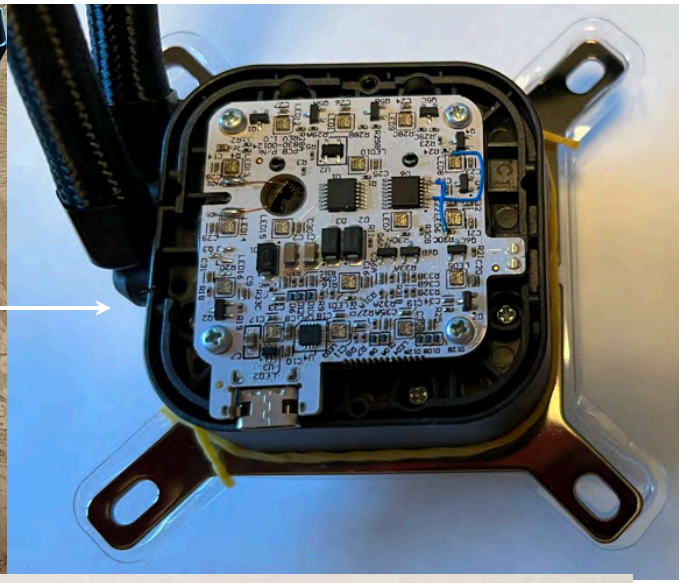
Exhibit D-7

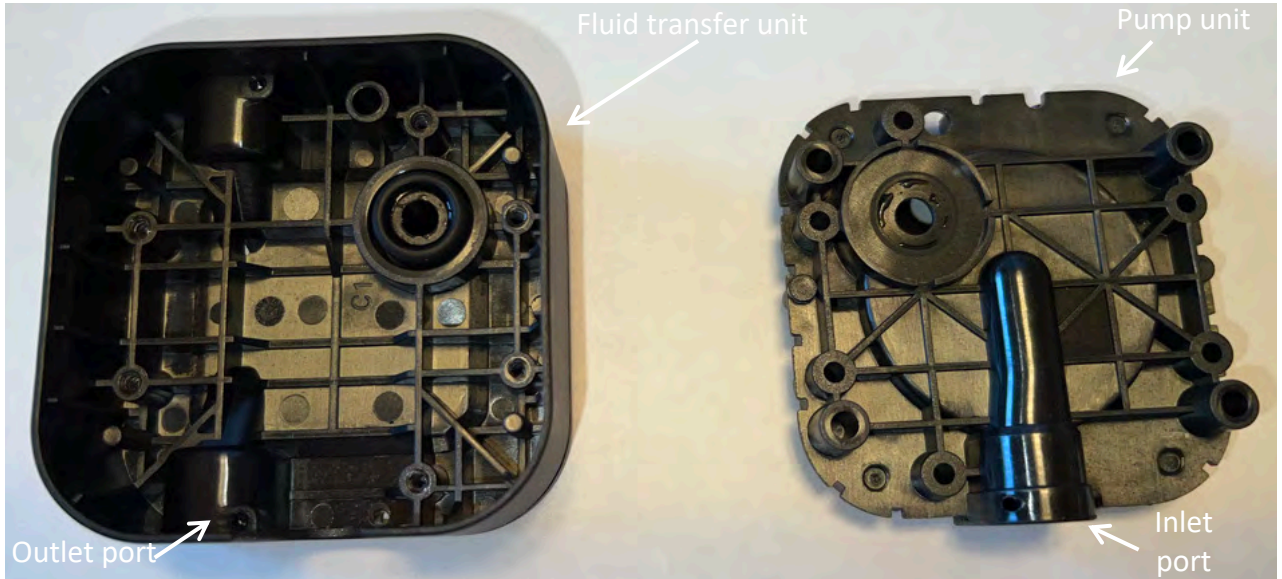
CoolIT's TAMRIEL Device

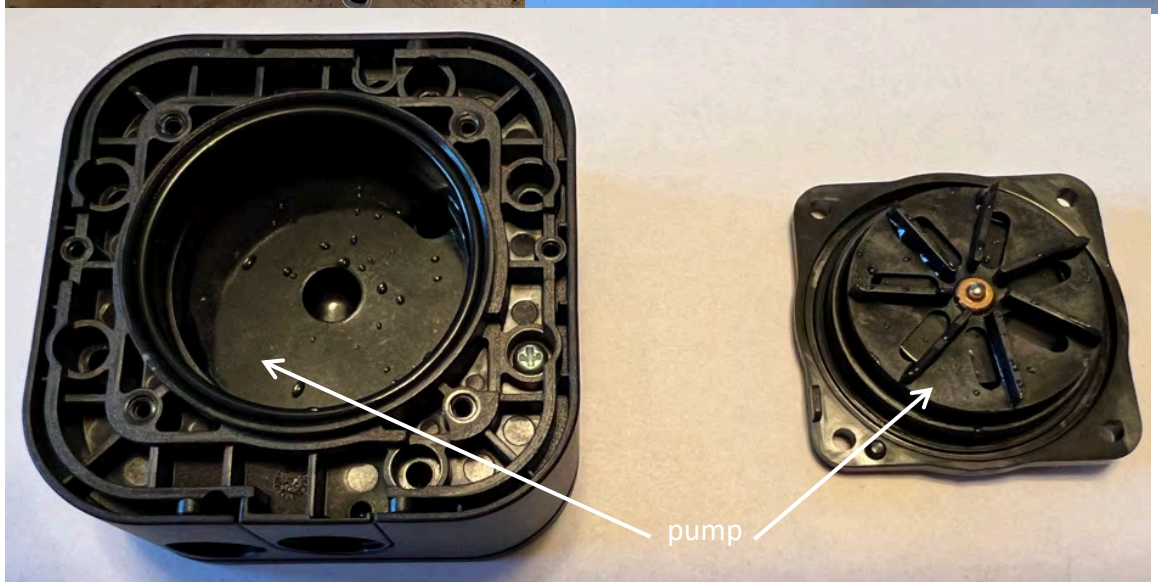
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1. A heat exchange system comprising:	The Tamriel Device is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



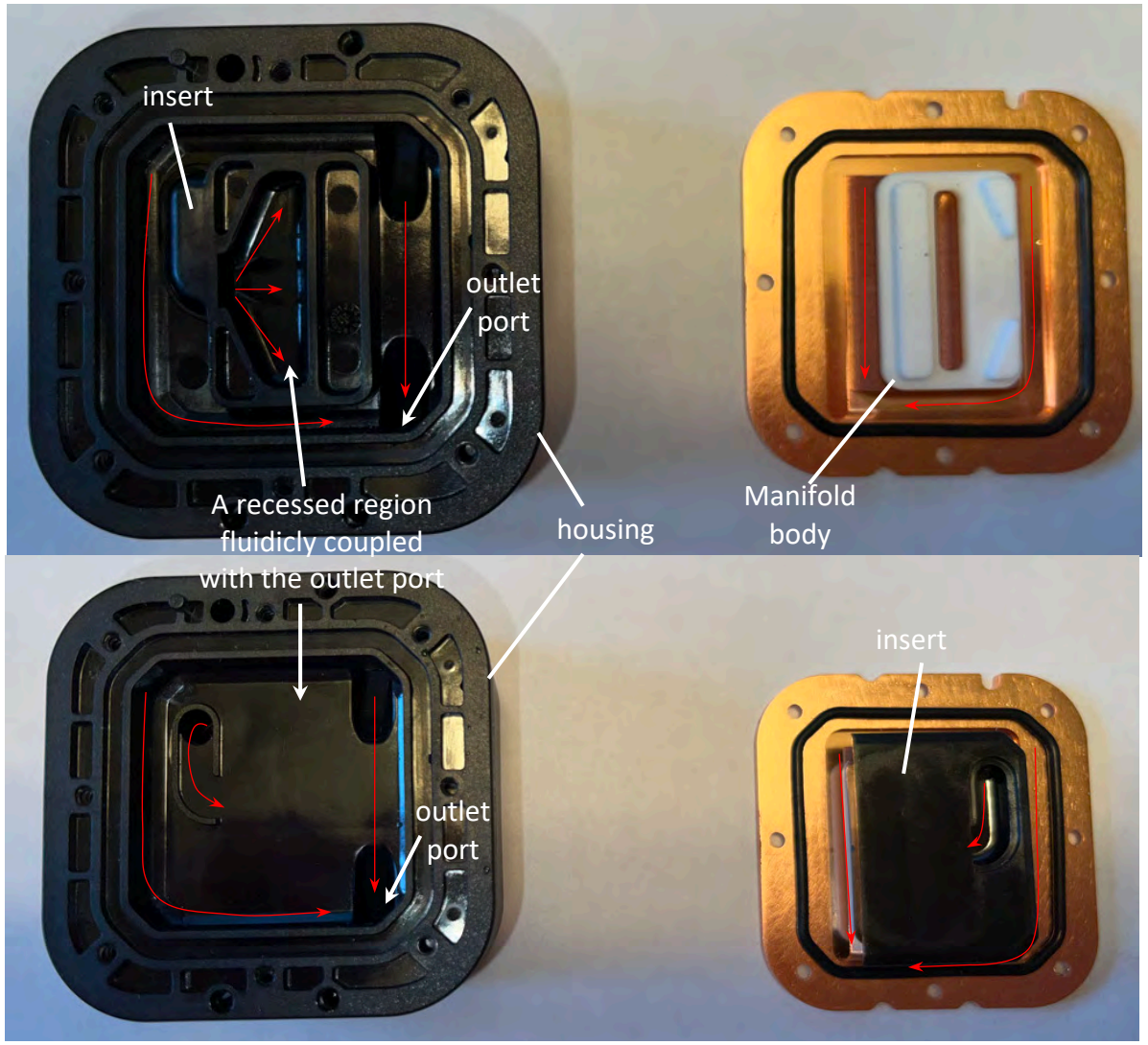






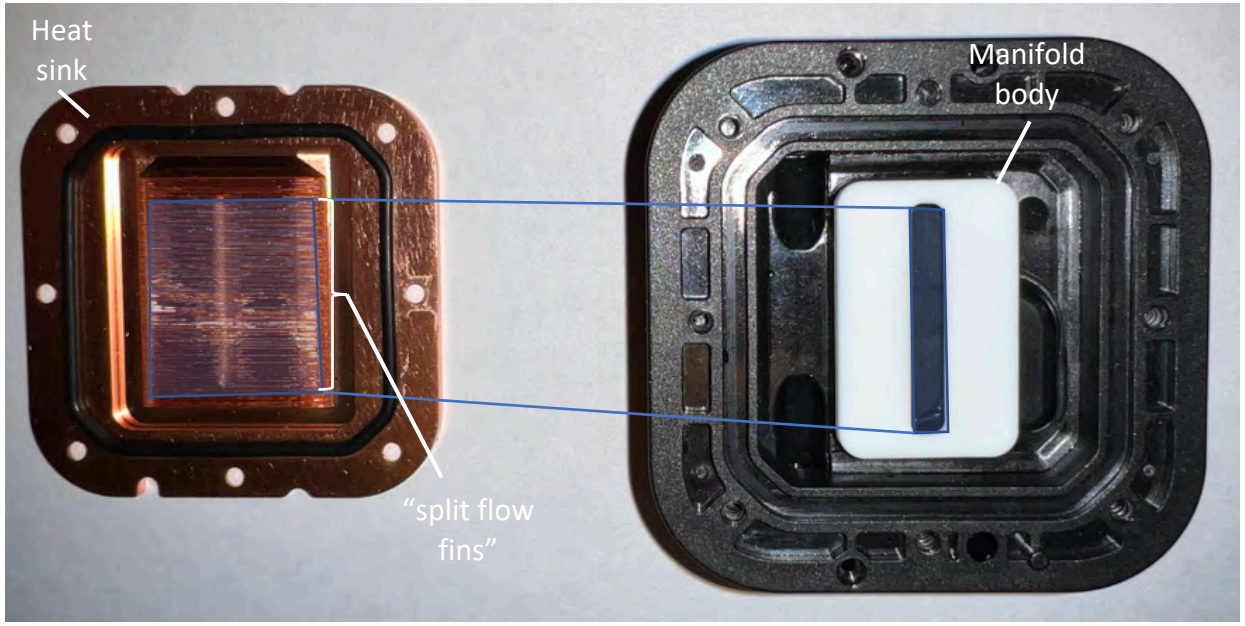
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[a]. a housing defining a recessed region and an outlet port fluidicly coupled with the recessed region;	The Tamriel Device device defines a recessed region and an outlet port fluidicly coupled with the recessed region. At left in the top and bottom images, the housing, together with an outlet port, is shown. In both images, the identified recessed region sits below and is set back from a perimeter of the identified recessed region. As shown at top left, the assembled housing defines such a recess. As shown at bottom left (e.g., when the housing insert shown at lower right is removed), the housing defines a deeper recess (blue shaded area at lower left). The insert at upper left (and lower right) rests within the recess shown at lower right. An outlet port defined by the housing (shown upper and lower left) receives coolant (indicated by red arrows) that flows through each of the above-identified recessed regions as the coolant passes through the Tamriel Device’s cold-plate module. Thus, regardless of which recessed region is selected, the outlet port is fluidicly coupled with the selected recessed region.



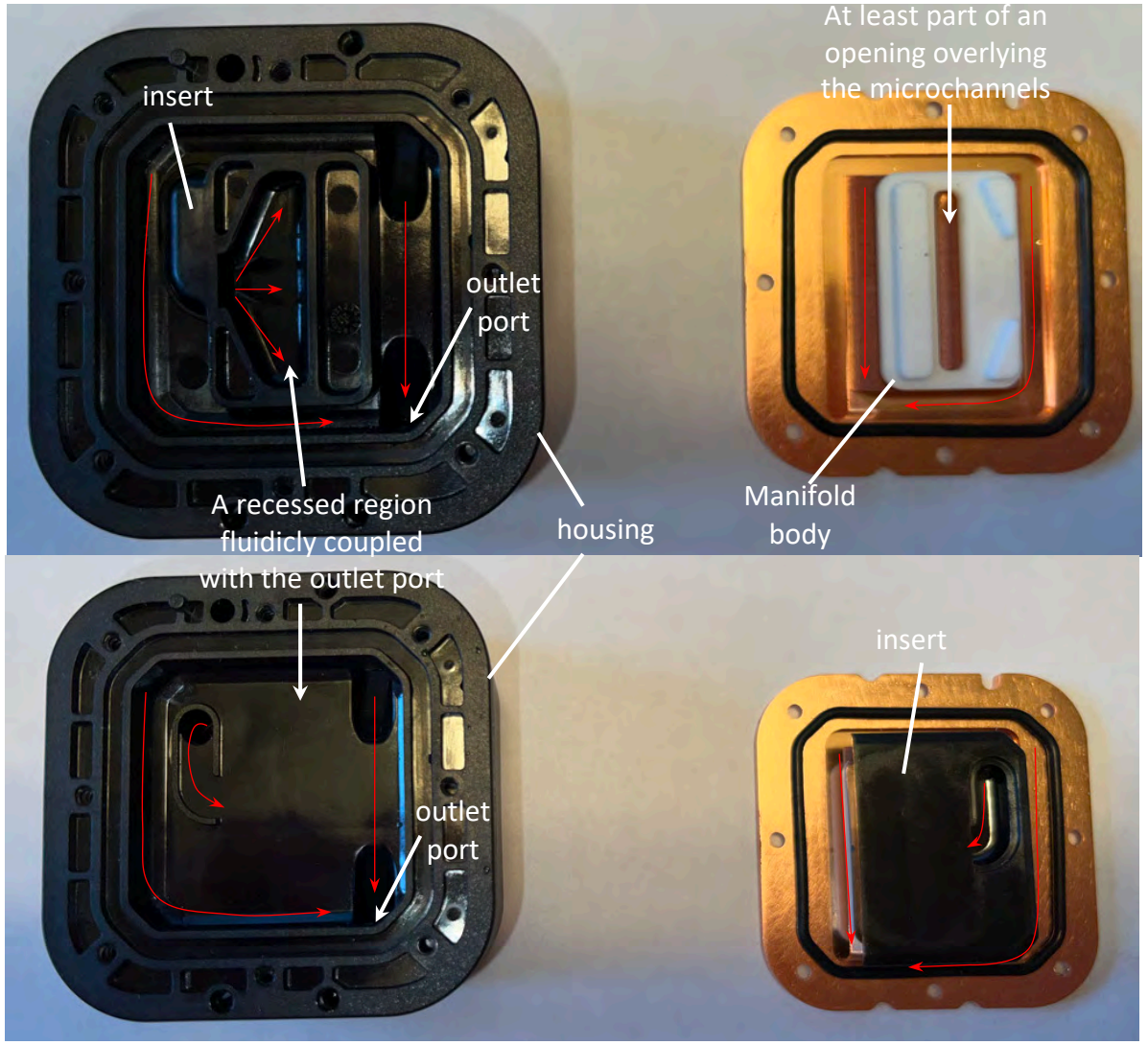
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[b]. a heat sink having a plurality of juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins;	The heat sink of the Tamriel Device device literally includes more than one fin, and this group of fins is spaced apart from each other without any intervening solid structure between them. And, the spacing between the fins define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the Tamriel Device satisfies the plurality of juxtaposed fins limitation. For example, the Tamriel Device device has a heat sink with a plurality of juxtaposed fins (e.g., each fin in the plurality of fins has no intervening solid structure between it and the next fin; right, shaded blue). The spacing between each pair of fins defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several spaced apart fins define a plurality of microchannels that correspond to the plurality of juxtaposed fins. As shown to the right, a group of juxtaposed fins and the corresponding plurality of microchannels are positioned beneath the opening (left, blue rectangle) in the manifold body. Each fin in this group is exposed directly to liquid flowing from the opening through the plate. These fins are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins.”



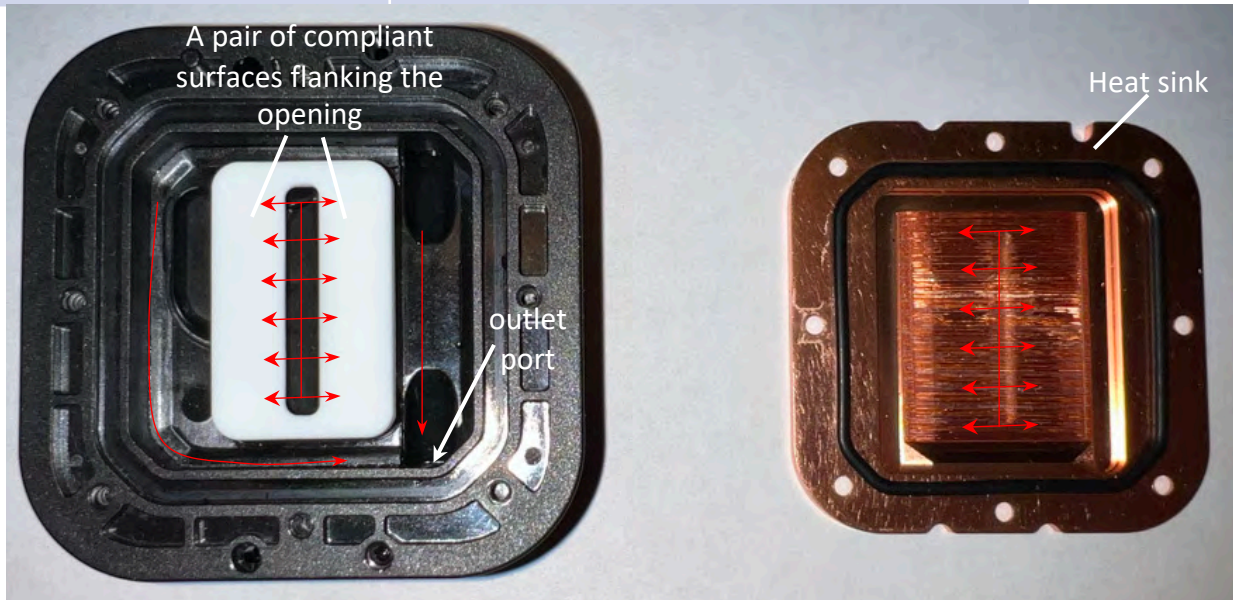
’266 Patent - Claim 1

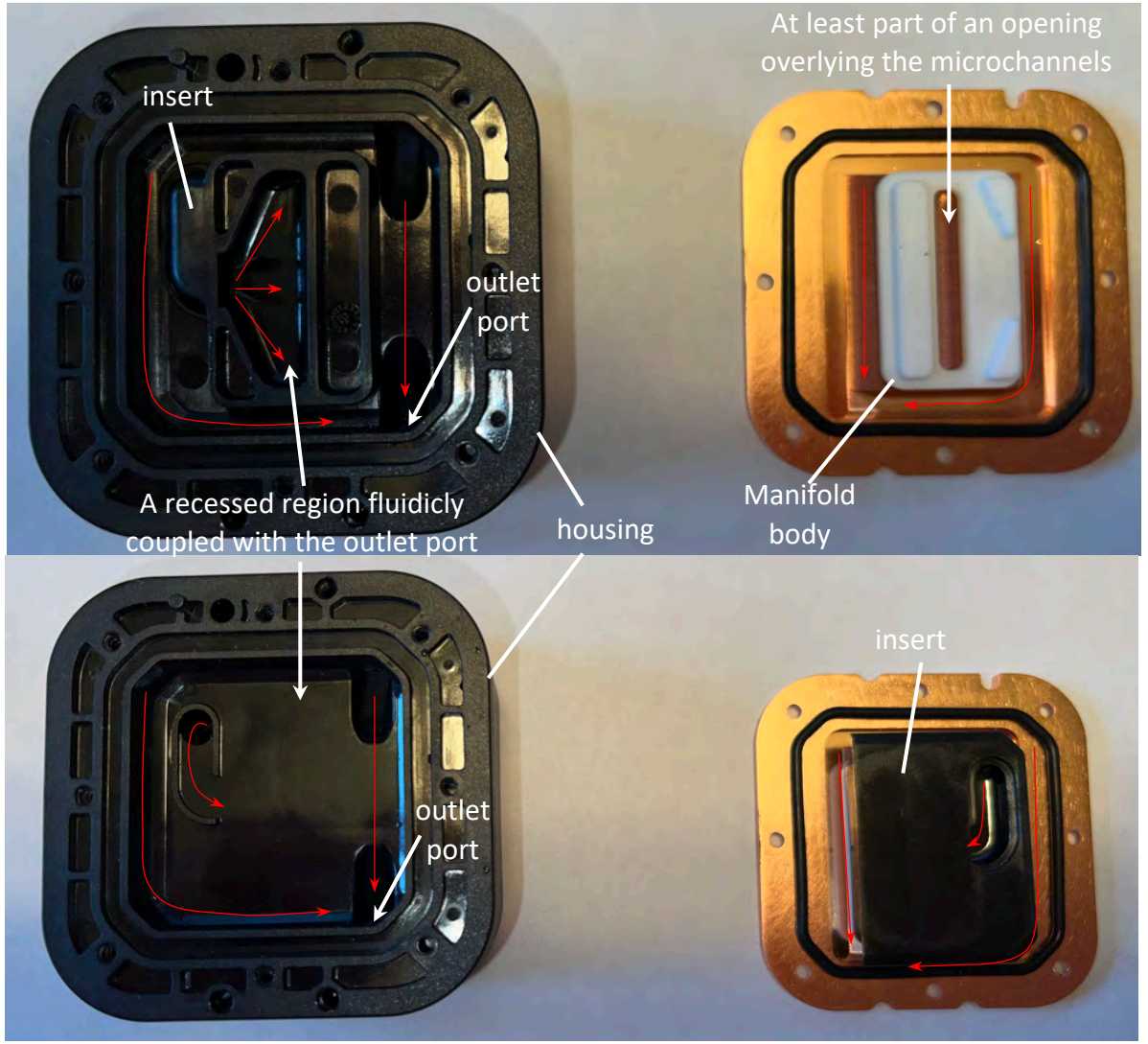
’266 Patent Claim	Comparison to Tamriel Device
1[c]. a manifold body at least partially defining an opening overlying the microchannels,	As shown at upper right, the Tamriel Device device includes a manifold body that overlies the microchannels, regardless of which definition of “plurality of fins” is used. As shown at upper right, the manifold body defines at least part of an opening positioned over the microchannels. (Note that the fins defining the microchannels are visible through the manifold body.)



’266 Patent - Claim 1

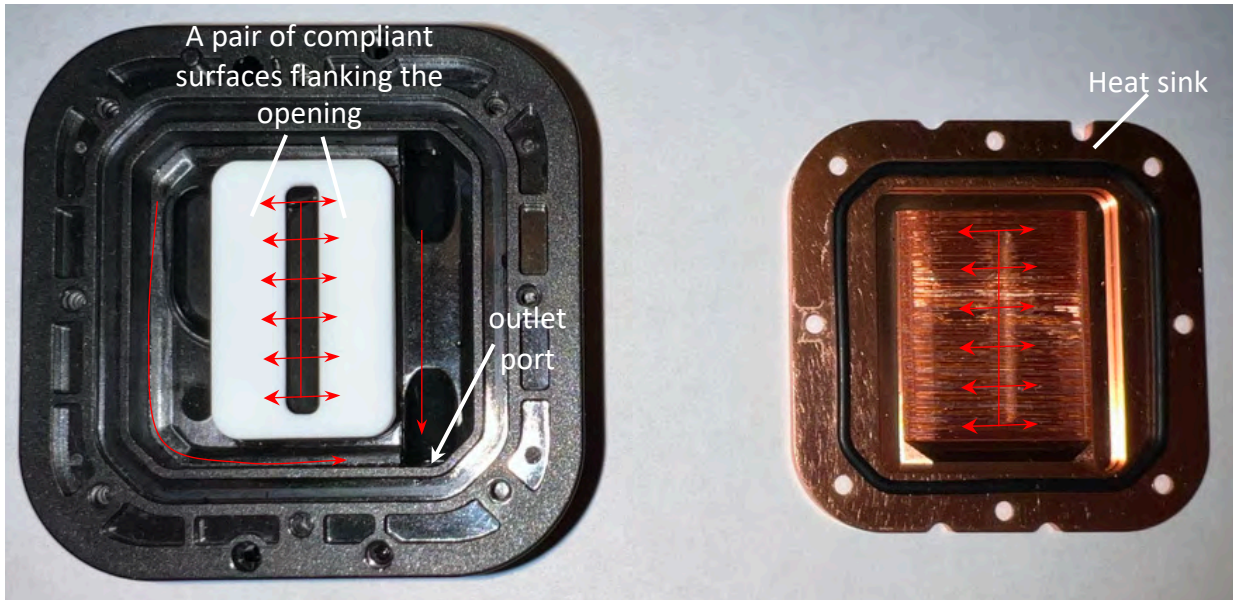
’266 Patent Claim	Comparison to Tamriel Device
1[d]. wherein the manifold body defines a pair of compliant surfaces flanking the opening,	Below, left, the Tamriel Device’s device’s pair of compliant surfaces made of a compliant polymer (e.g., rubber) are shown flanking the opening.

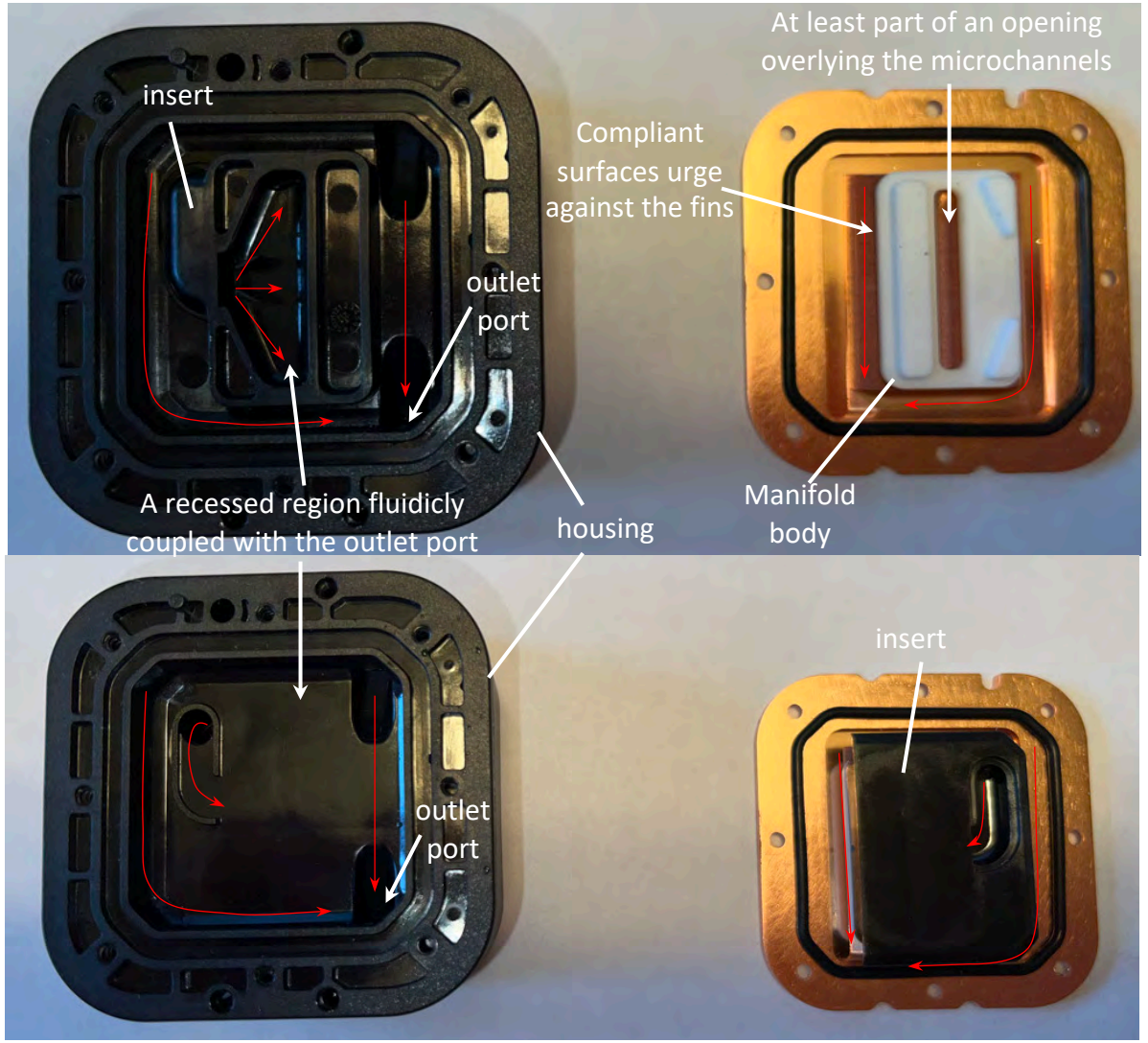




’266 Patent - Claim 1

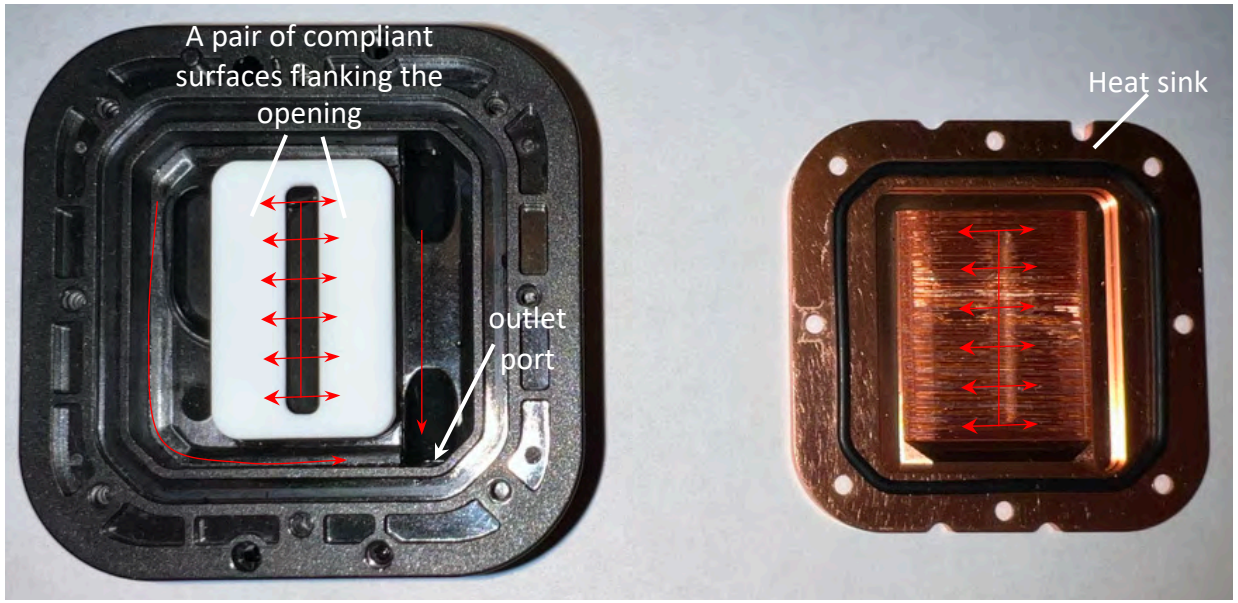
’266 Patent Claim	Comparison to Tamriel Device
1[e]. wherein the compliant surfaces urge against the fins, defining a flow boundary of the microchannels,	When the heat sink is assembled with the housing, the Tamriel Device’s cold-plate module compresses the manifold body (top right) between the heat sink and the housing, which urges the compliant surfaces against the fins and defines a flow boundary of the microchannels. The flow boundary inhibits coolant from leaking out of the microchannels, which would otherwise decrease cooling performance.

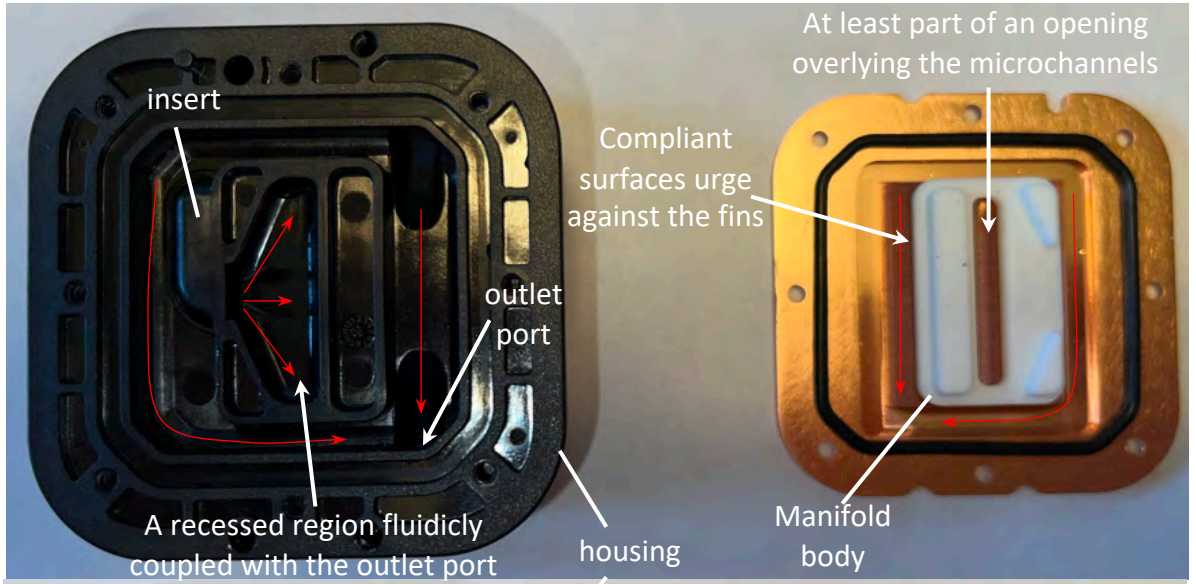


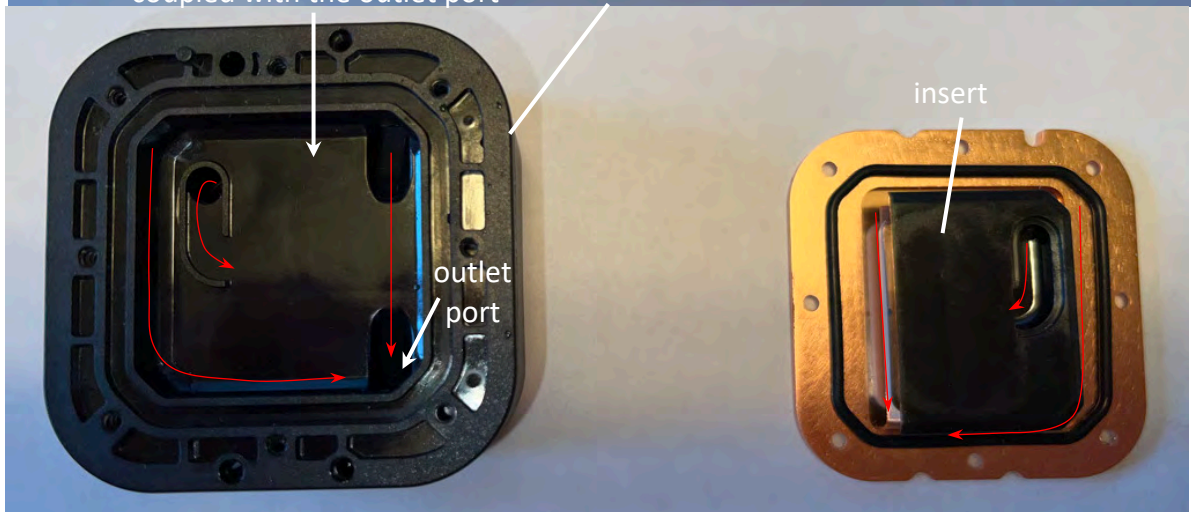


’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[f]. wherein the opening extends transversely relative to the fins and is configured to distribute a working fluid among the microchannels,	As the images below and at upper right show, the opening extends transversely (e.g., across the tops of) the fins. The central red line (below, left) lies within the opening (e.g., as a longitudinal axis of the opening) and is superimposed over the fins in the image below, right, to indicate a flow of a working fluid being distributed among the microchannels.

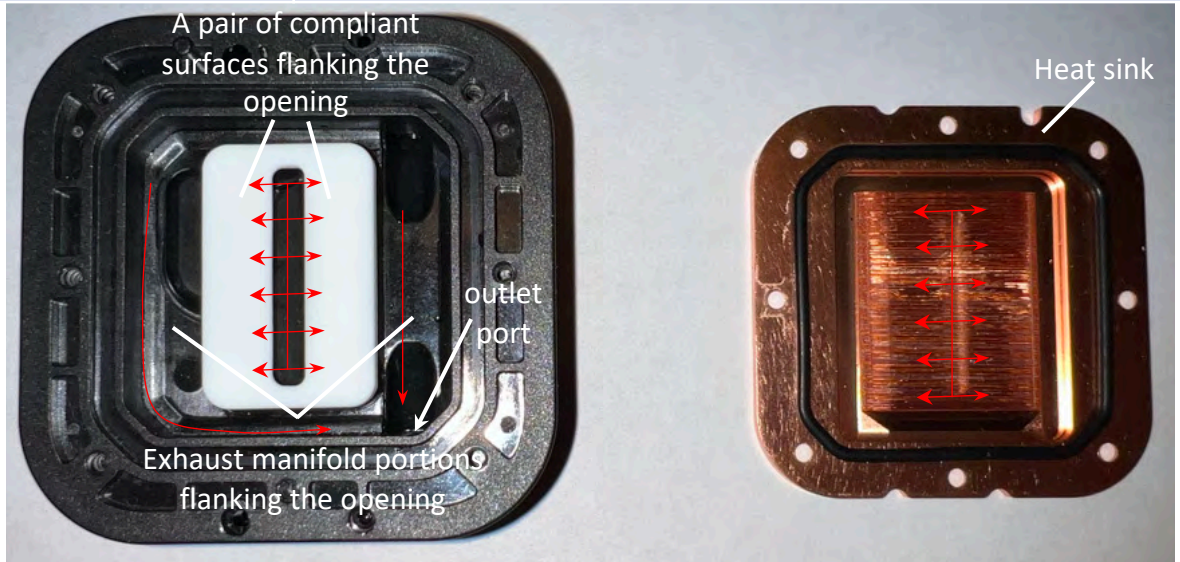


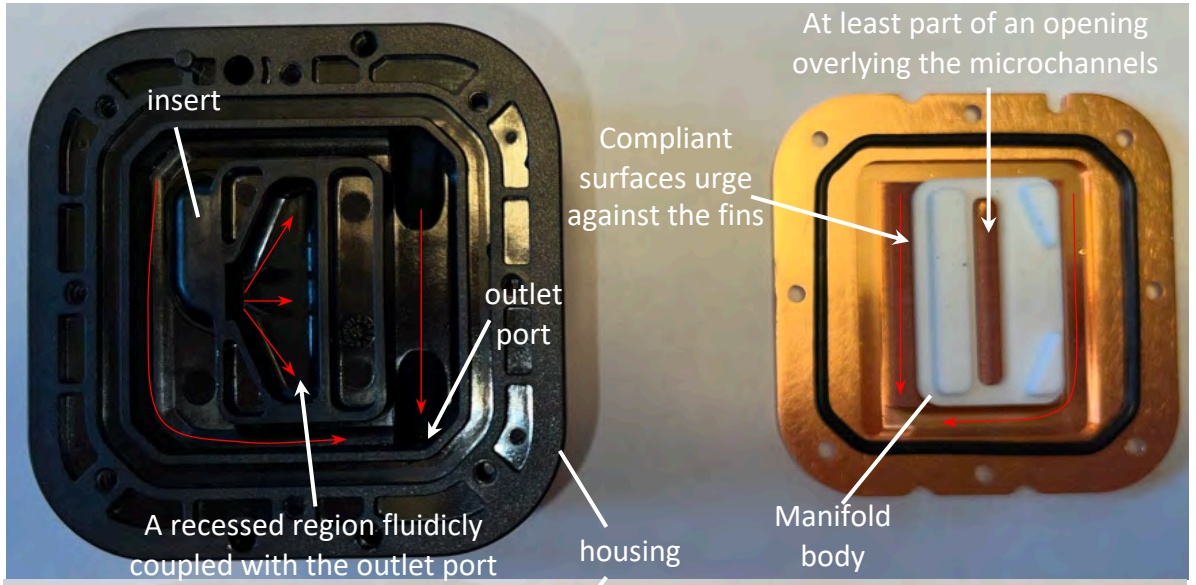


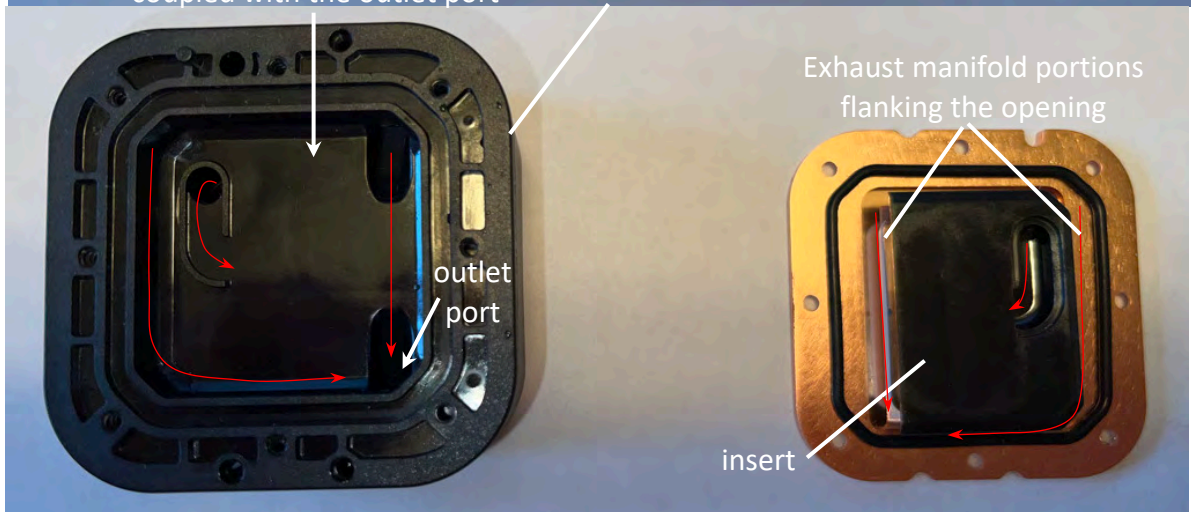


’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[g]. wherein the manifold body partially occupies the recessed region of the housing, leaving a pair of opposed portions of the recessed region unfilled, defining opposed exhaust manifold portions flanking the opening and being configured to receive the working fluid from the microchannels, and	The photo below, left, shows the manifold body positioned within and thus partially occupying the recessed region of the housing, regardless of which recessed region defined by the housing is selected. In leaving a pair of opposed portions of the selected recessed region unfilled, the manifold body defines opposed exhaust manifold portions flanking the opening (also shown lower right). The outwardly directed red arrows shown below, right, indicate a flow of the working fluid through the microchannels. The outwardly directed red arrows are superimposed below, left, showing that the outwardly directed flows of the working fluid through the microchannels enter the opposed exhaust manifold portions. Thus, the opposed exhaust manifold portions flanking the opening are configured to receive the working fluid from the microchannels, as claimed.

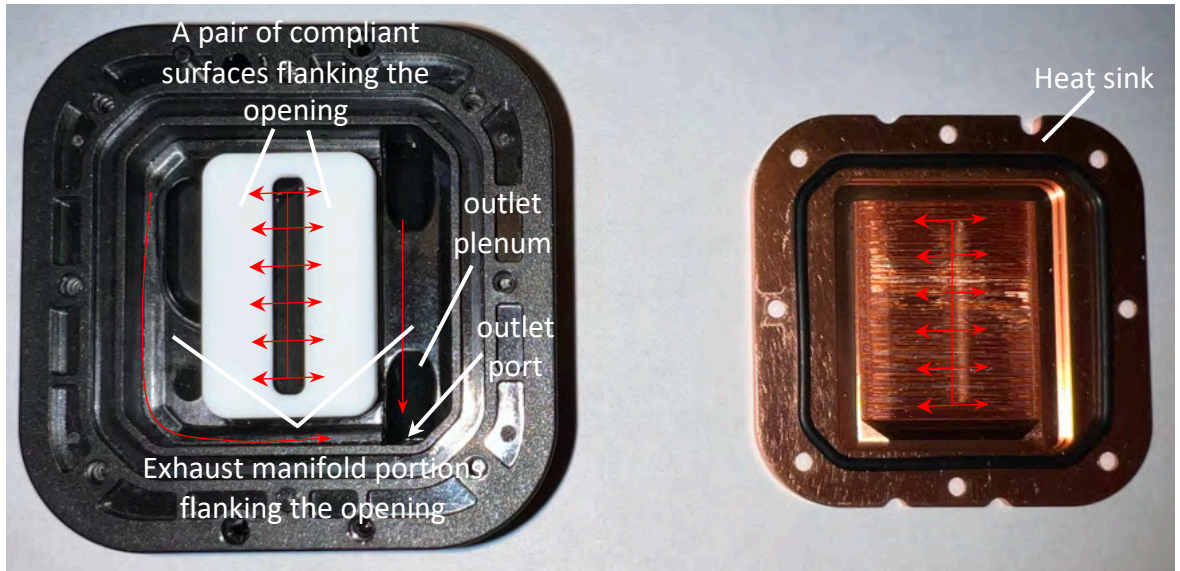


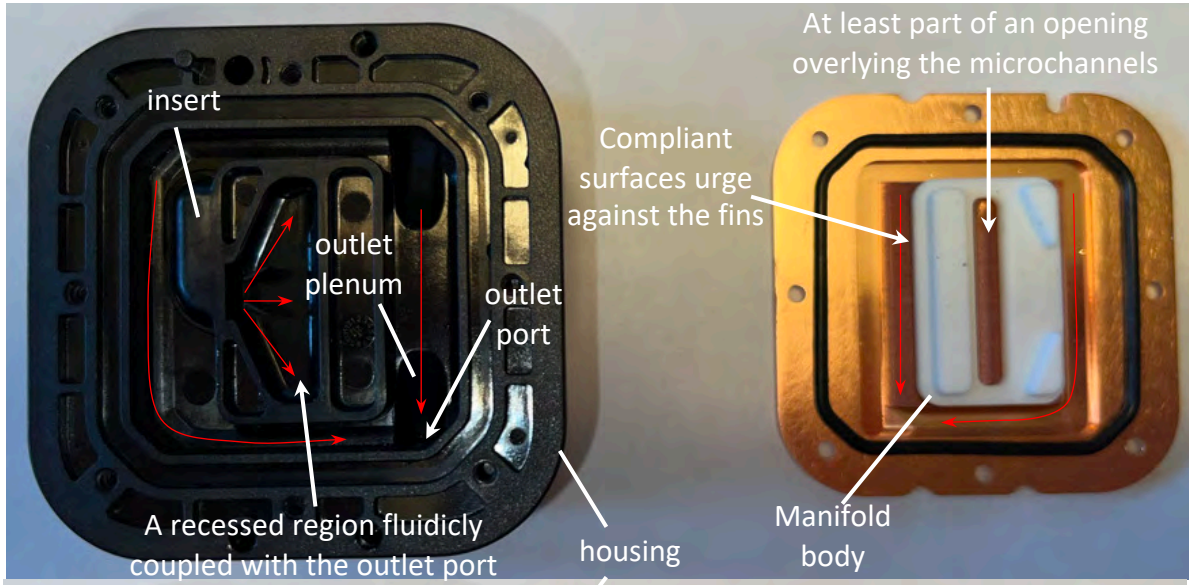


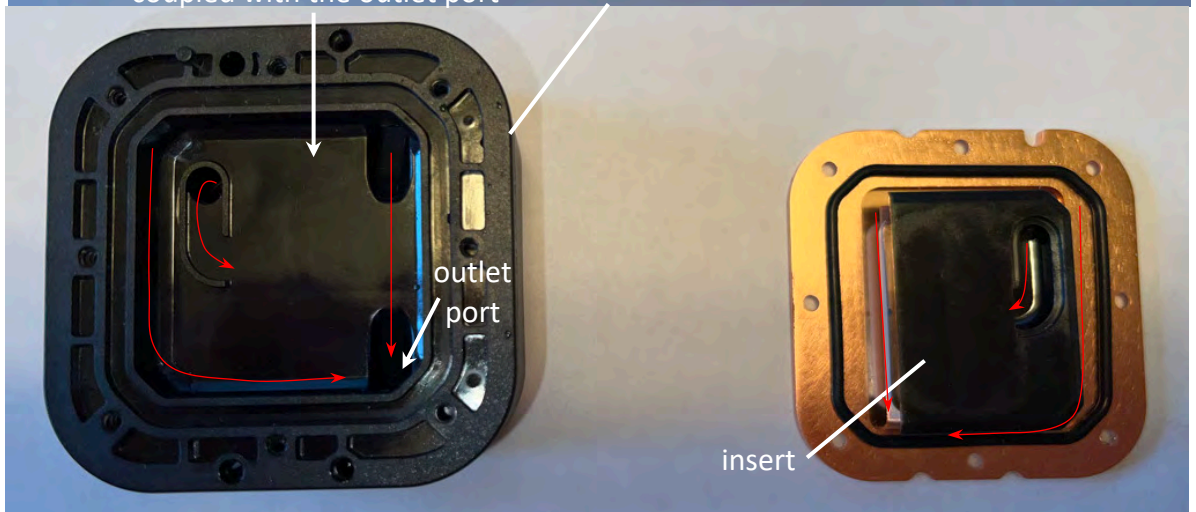


’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[h]. wherein the housing further defines an outlet plenum configured to receive the working fluid from the exhaust manifold portions and to convey the working fluid to the outlet port.	The photograph below, left, shows an outlet plenum that receives the working fluid from the exhaust manifold portions. The outlet plenum conveys the working fluid to the outlet port.

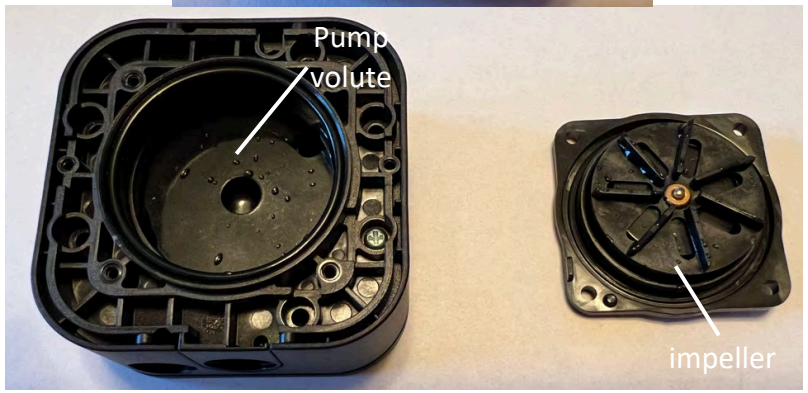


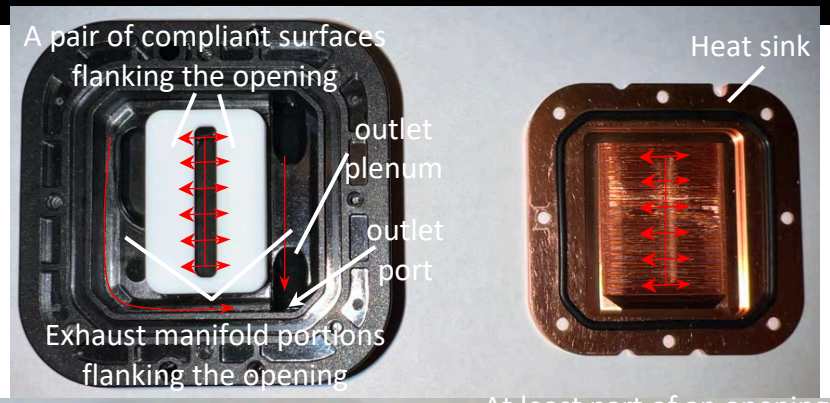


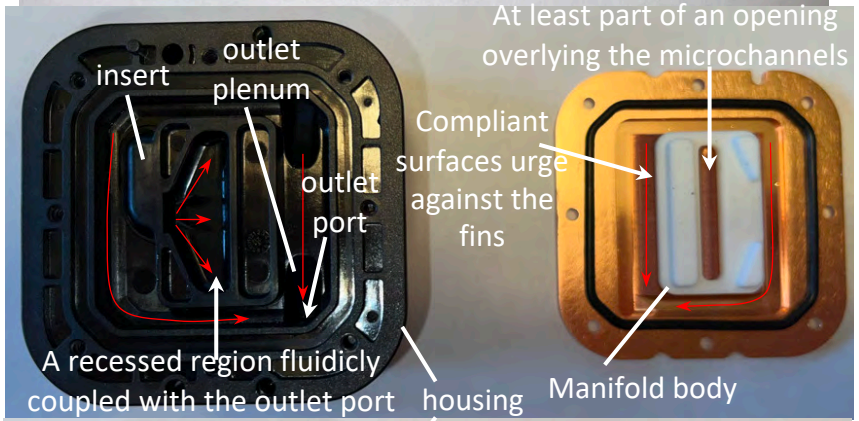


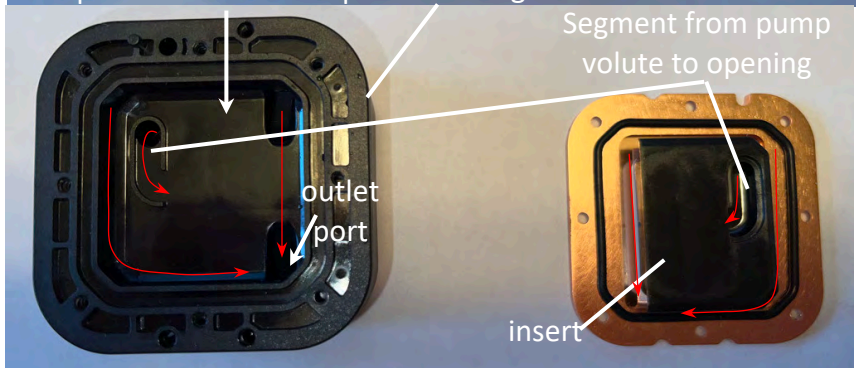
’266 Patent - Claim 2

’266 Patent Claim	Comparison to Tamriel Device
2. The heat exchange system according to claim 1, wherein the housing defines a pump volute and a segment of a flow path, the segment configured to convey the working fluid from the pump volute to the opening at least partially defined by the manifold body, the heat exchange system further comprising an impeller positioned in the pump volute and configured to urge the working fluid along the flow path.	As indicated at lower right, the assembled housing defines a segment of a flow path configured to convey the working fluid from the pump volute to the opening defined in part by the manifold body. The image at lower left shows the housing defines a pump volute. The impeller is shown removed from the pump volute, but when assembled as at upper left, the impeller is positioned in the pump volute and configured to urge the working fluid through the claimed heat exchange system.



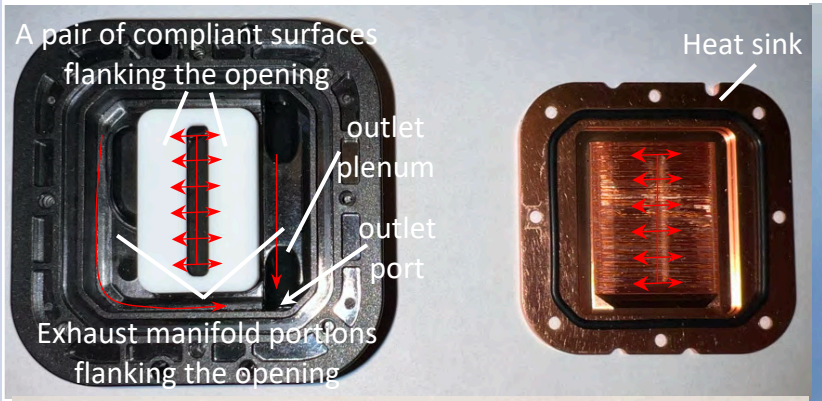


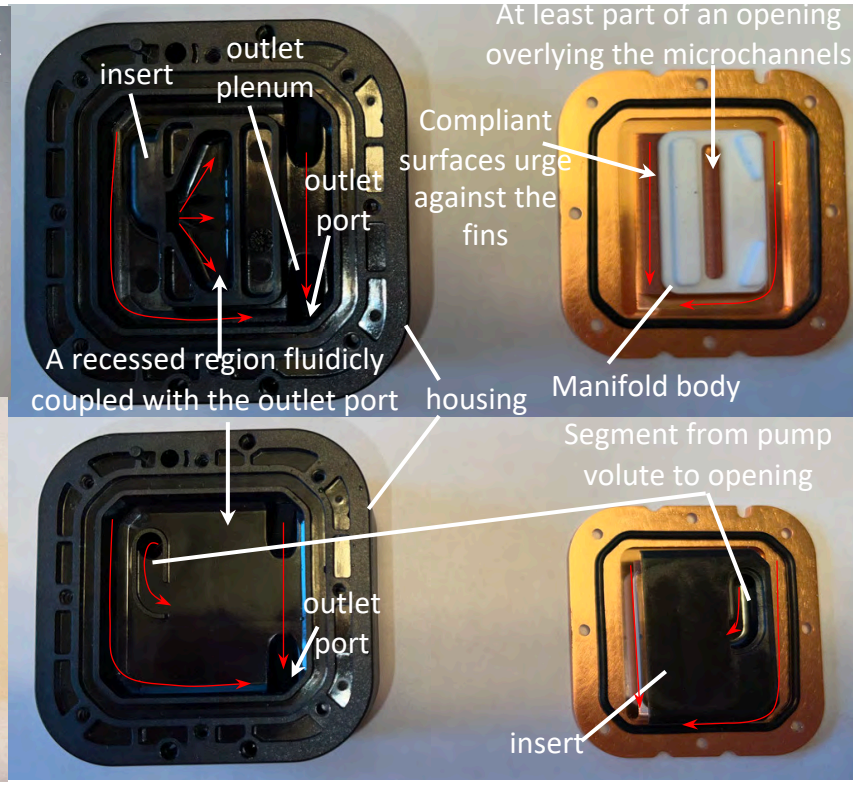




’266 Patent - Claim 5

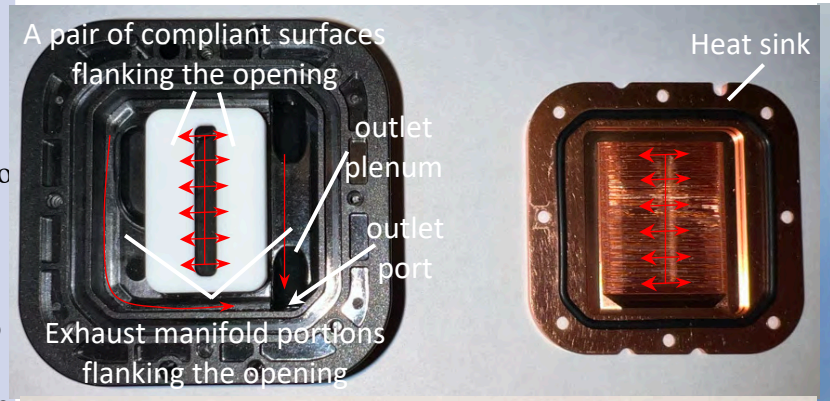
’266 Patent Claim	Comparison to Tamriel Device
5. The heat exchange system according to claim 2, wherein the housing defines an inlet port, wherein the flow path extends from the inlet port to the outlet port and is configured to convey the working fluid from the inlet port through the pump volute, the manifold body, the microchannels, the opposed exhaust manifold portions, and the outlet plenum to the outlet port.	The lower left image shows an inlet port and the outlet port. The red arrows indicate the path that the working fluid follows through the cold-plate module of the Tamriel Device. As indicated at lower left, the fluid enters from the inlet port and flows through a channel into an entrance to the pump volute. On entering the pump volute (lower left), the spinning impeller (shown removed) imparts momentum to the working fluid, which exits the pump volute along the indicated segment of the flow path. Referring to the lower right image, the flow from the pump volute passes into the segment from the pump volute to the opening. At upper right, the flow path extends through the diffuser of the insert, through the manifold body (to the left in the upper-right image) and enters the microchannels (to the right in upper-right image). The opposed exhaust manifold portions (upper left image) collect the working fluid from the microchannels and the working fluid follows the flow path into the outlet plenum (curved red arrows in upper left), which conveys the working fluid to the outlet port (upper left and lower left).

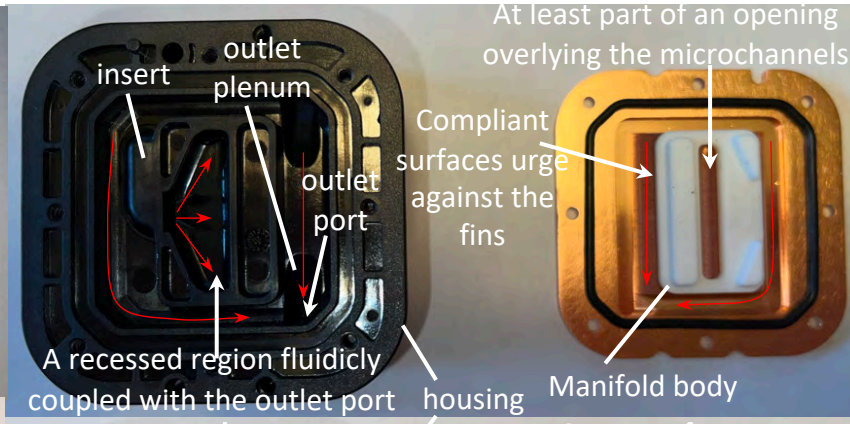


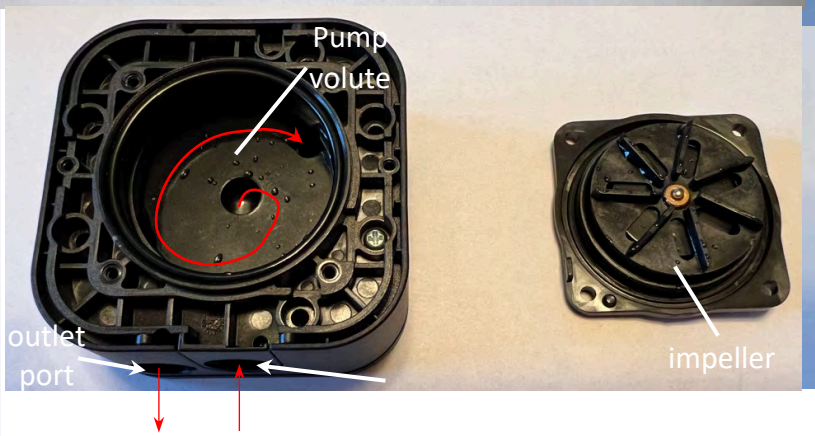


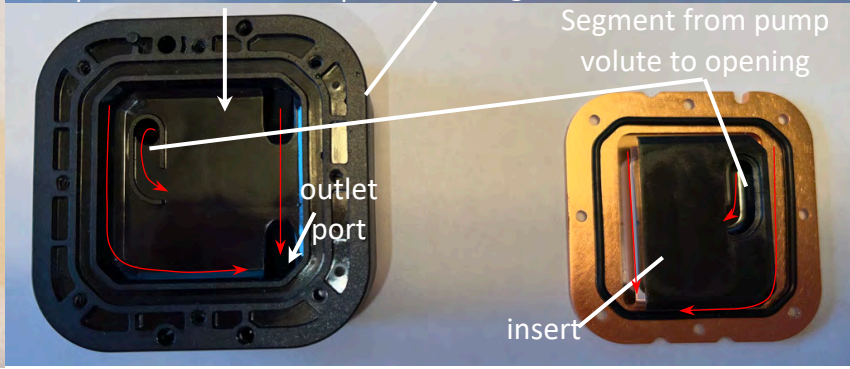
’266 Patent - Claim 9

’266 Patent Claim	Comparison to Tamriel Device
9. The heat-exchange module according to claim 1, wherein a flow of the working fluid defines a flow path, wherein the flow path is distributed among the plurality of microchannels, and, within each microchannel, the flow path bifurcates into a pair of opposed sub-flow paths directed away from each other.	Coolant flow through the Tamriel Device defines a flow path. Red arrows superimposed on the images at right indicate the flow path. After exiting the pump, the coolant passes into the opening overlying the microchannels (indicated by central, outwardly fanning red arrows in upper left image) then into the microchannels. As the coolant flows over top the microchannels, the coolant flow (and thus the path the flow defines) is distributed among the plurality of microchannels, as indicated by the red arrows superimposed at left on the upper left image. The coolant flow enters each of the microchannels and, within each microchannel, splits (or bifurcates) into outwardly directed sub-flows (indicated by the outwardly directed red arrows superimposed at right on the upper left image). Thus, the coolant flow defines a flow path that bifurcates within each of the split-flow microchannels into a pair of opposed sub-flow paths directed away from each other, as claim 9 recites



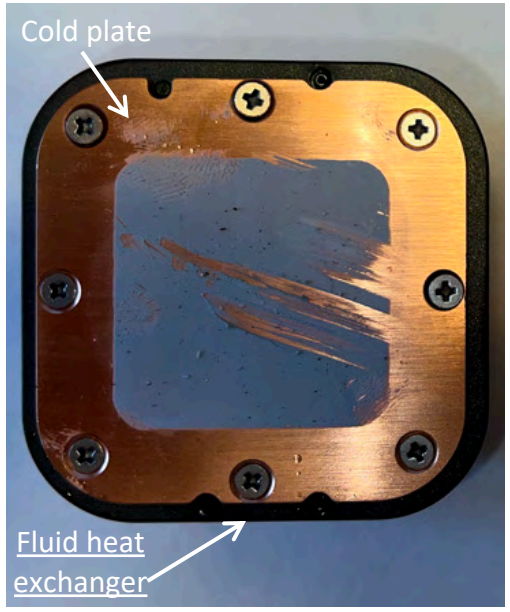


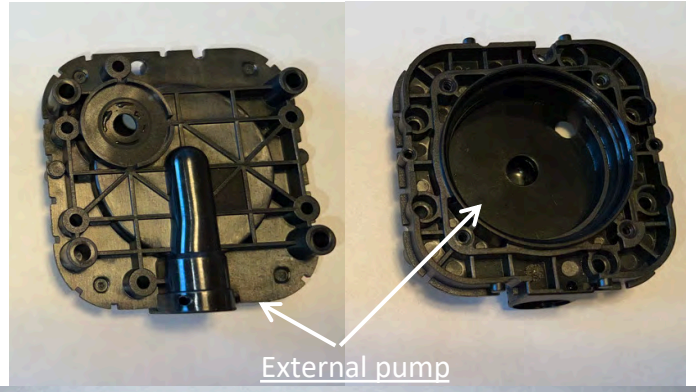


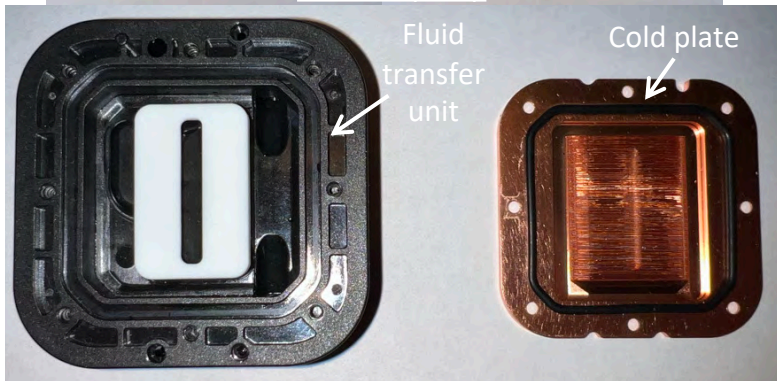


’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The Tamriel Device is a modular heat-exchange system having a fluid receiver unit, a fluid transfer unit, and a cold plate coupled with the fluid transfer unit. In the embodiment shown, the fluid receiver unit includes a pump and is separable from the fluid transfer unit and the cold plate (top right, middle right). The fluid transfer unit and the cold plate (bottom right) together form a fluid heat exchanger. For example, the assembled fluid transfer unit and cold plate (shown at left) includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. The Tamriel Device device has a cold plate and a housing (at left in the top right and middle right images) that are separable from the fluid receiver unit which contains the pump (at right in the top right and middle right images). Thus, the Tamriel Device device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component."

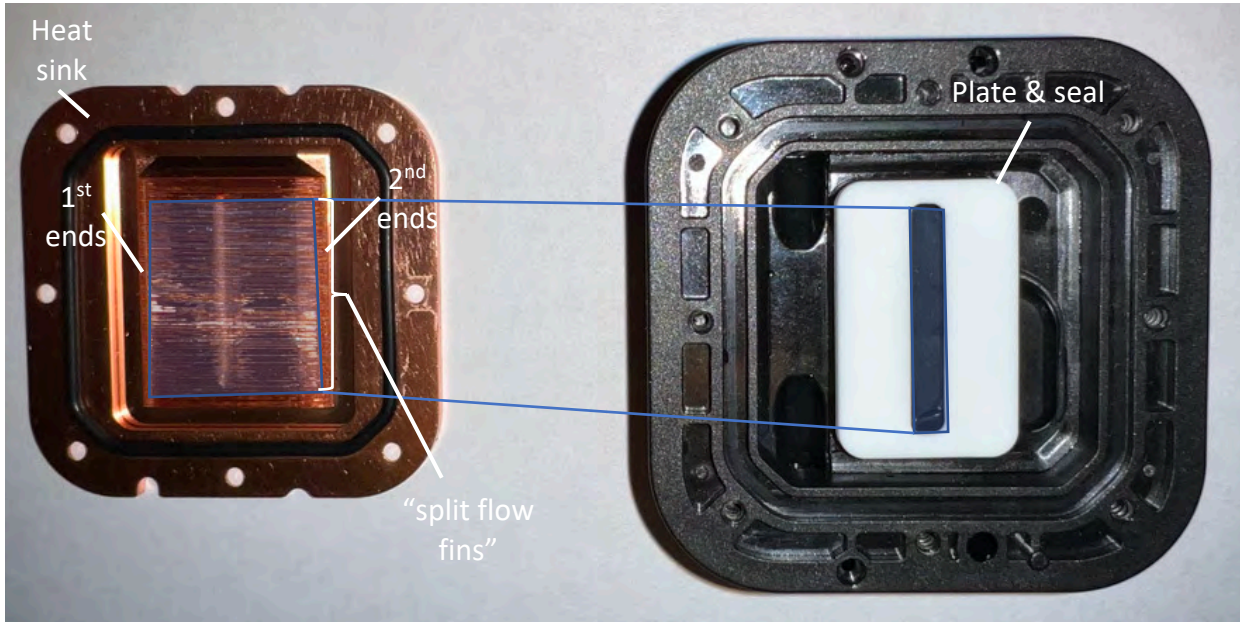






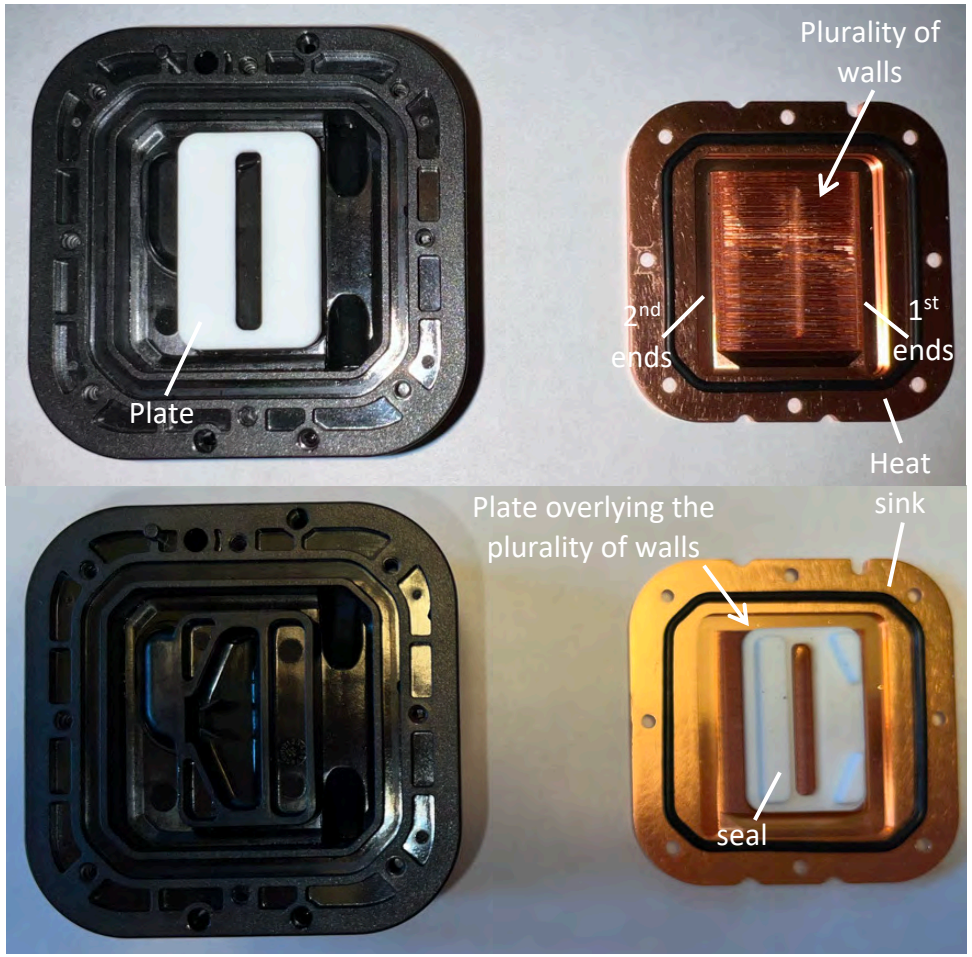
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[a]. a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;	The Tamriel Device literally includes more than one wall, and this group of walls is spaced apart from each other, defining channels. And, the spacing between the walls define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the Tamriel Device satisfies the plurality of walls limitation. For example, the Tamriel Device has several spaced-apart walls (e.g., right, shaded blue). The spacing between each pair of walls defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several walls define a plurality of microchannels that correspond to the walls. As shown to the right, a group of walls and microchannels (left) is positioned beneath the opening (right) in the plate. Each wall in this group is exposed directly to liquid flowing from the opening through the plate. These walls are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “plurality of walls.” Each microchannel extends from a first end to a second end.



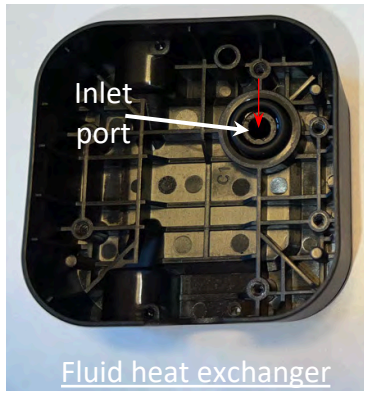
’266 Patent - Claim 13

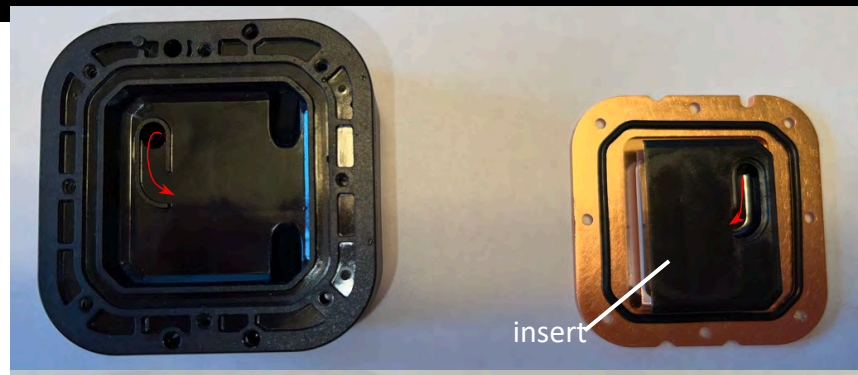
’266 Patent Claim	Comparison to Tamriel Device
13[b]. a plate overlying the walls; and a seal, wherein the seal is a portion of the plate;	The top left image shows a plate that overlies the plurality of walls, whether the plurality of walls is identified as the “split-flow fins” or another selected group of fins containing more than one fin. The lower right image shows the plate overlying the fins, as well as the seal being a separately identifiable structure that is formed as a unitary construct with the plate (upper left image). Thus, the seal constitutes a portion of the plate as claimed. See, ’266, col. 12:43-44 (“Seal 230 may be installed as a portion of the plate or separately.”); FIGS. 5 and 6 (illustrating the seal 230 as being structure that is continuous and monolithic with the plate 240 and tabs 242).

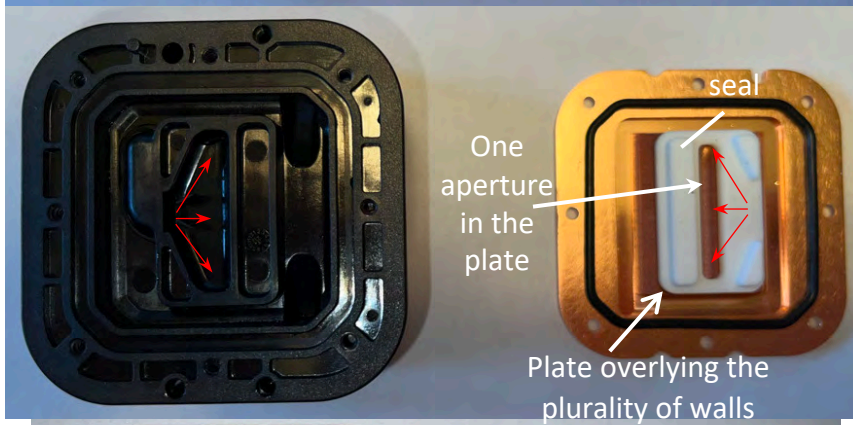


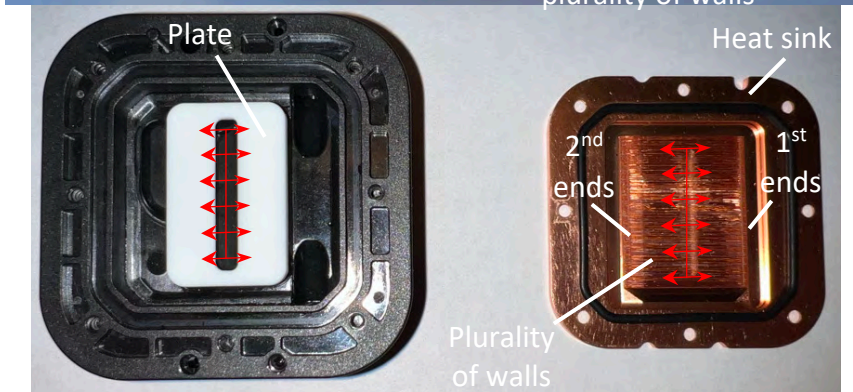
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[c]. a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;	The red arrows superimposed on images to the right depict the fluid inlet passage by showing segments of the continuous passage from the inlet port through various components and ultimately to the opening into the microchannels. Although not a portion of the inlet passage, flow through the microchannels is indicated by the outwardly extending red arrows in the lower image. At right in the middle-right image, a portion of the fluid inlet passage that delivers coolant through one aperture in the plate to each microchannel is shown. The fluid inlet passage delivers the heat-exchange fluid to each microchannel at a position between the first and second end of each respective microchannel (indicated by outwardly extending arrows in the lower image).



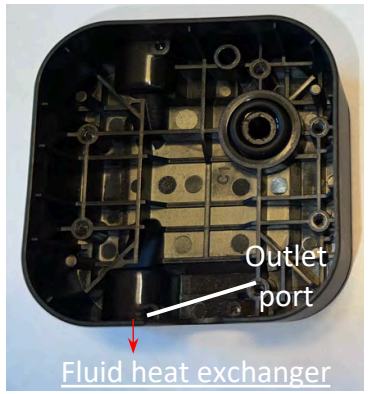


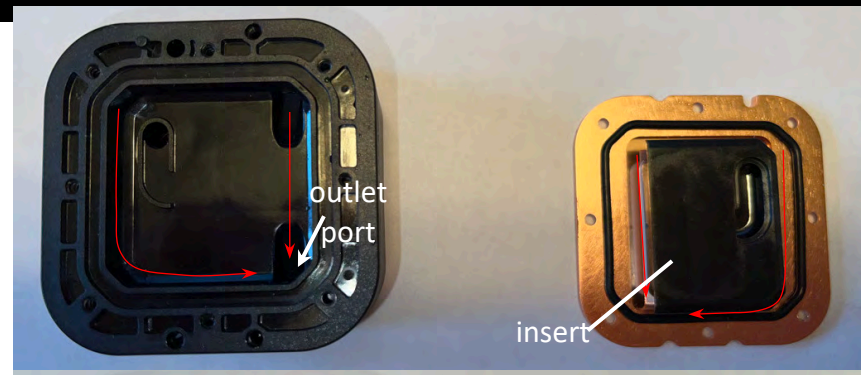


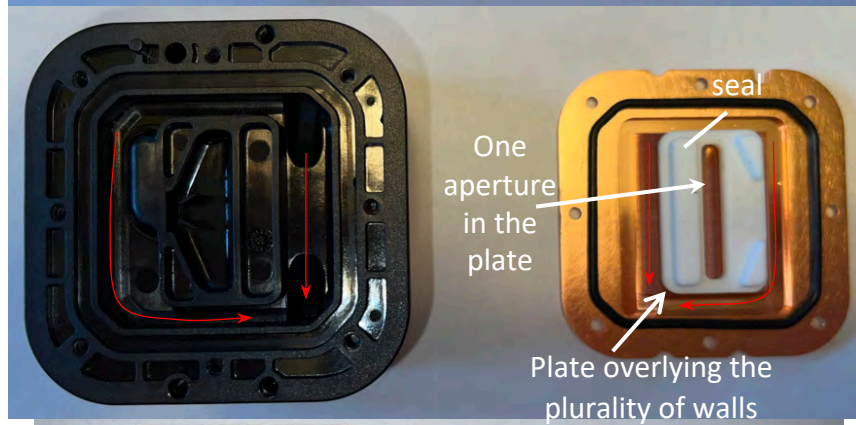


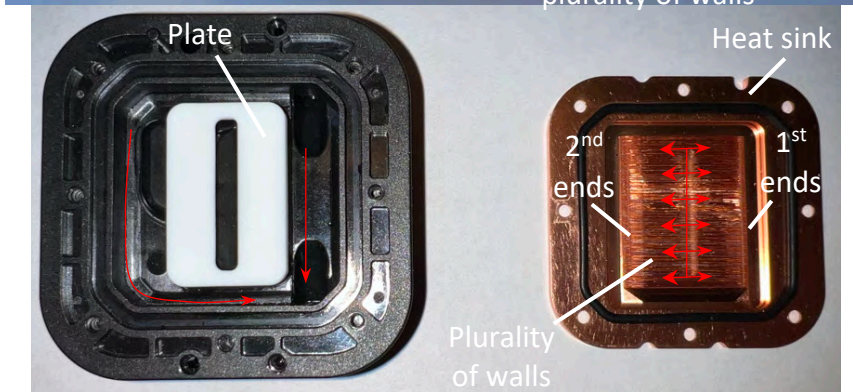
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[d]. a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel,	At left in the bottom image, a fluid outlet passage is indicated by red arrows. The indicated fluid outlet passage is configured to receive the heat exchange fluid from the first end and the second end of each microchannel (indicated at right in bottom image0. As the red arrows on the previous slide indicate, the coolant enters the microchannels and bifurcates into two sub flows: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage (indicated by the red arrows at lower left) receives the coolant from both ends of each microchannel and delivers the coolant to the outlet port (left image).



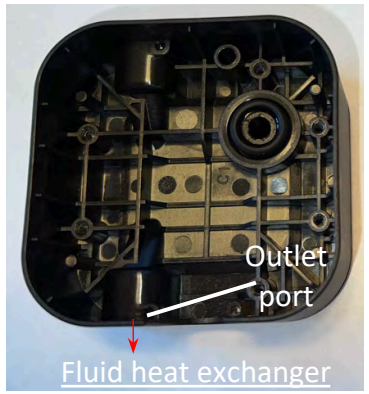


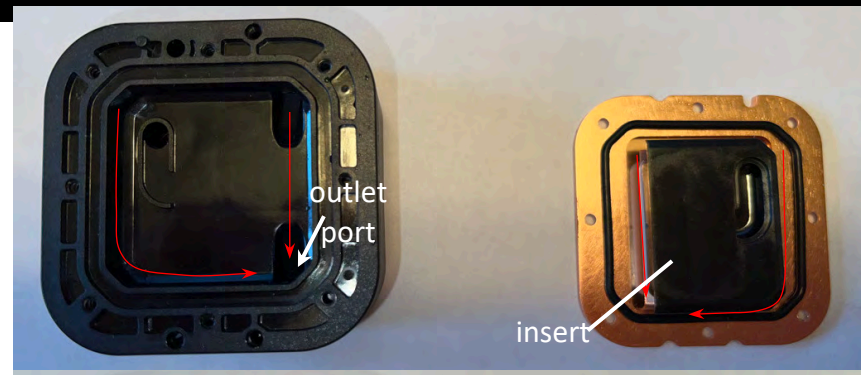


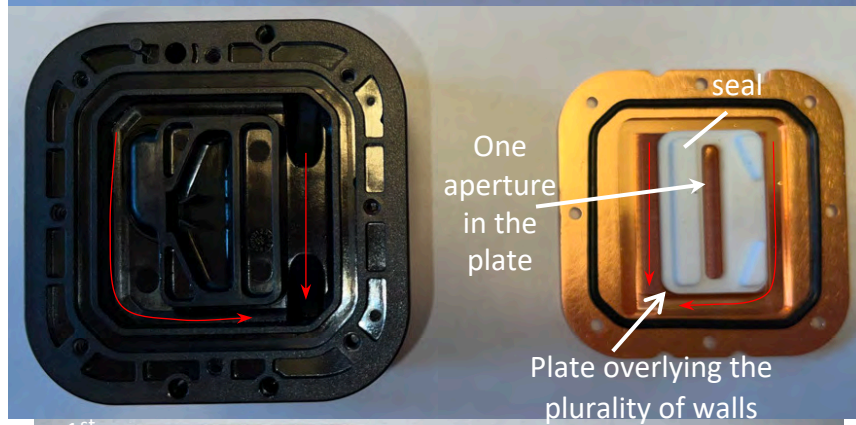


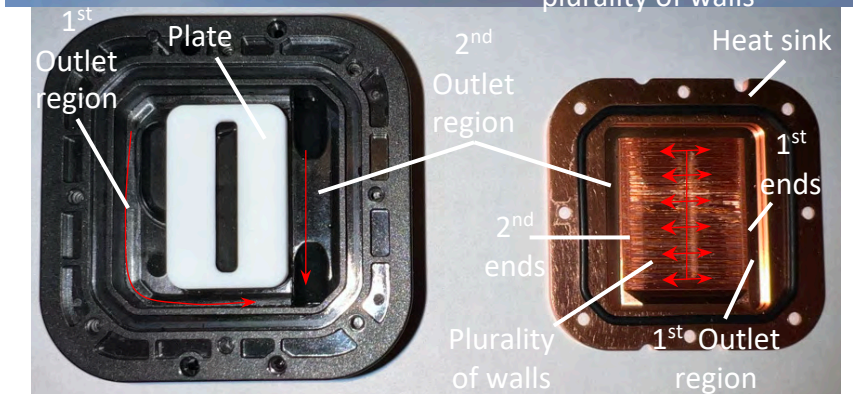
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Tamriel Device
13[d][1]. wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends,	The lower image shows that the fluid outlet passage has a first outlet region positioned with no intervening solid structure between it and the microchannel first ends and a second outlet region positioned with no intervening solid structure between it and the microchannel second ends.



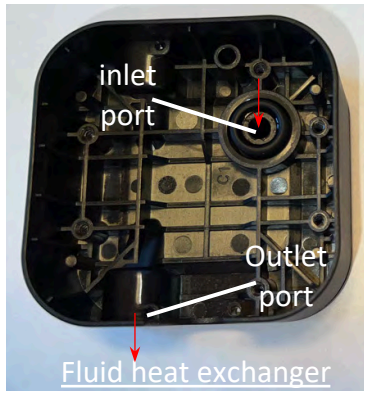


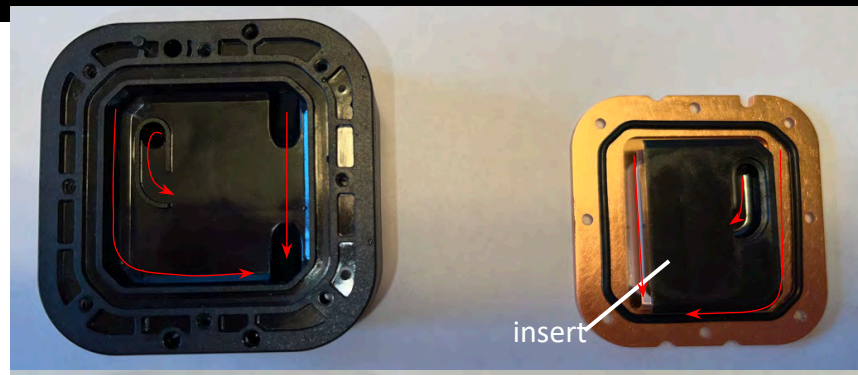


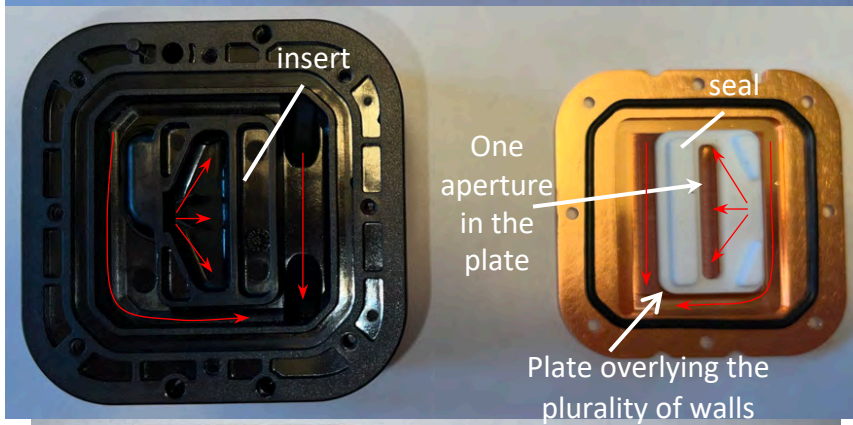


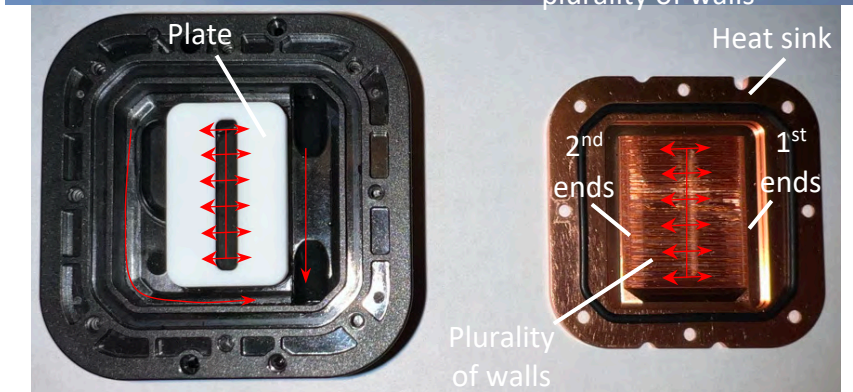
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[d][2]. wherein the seal separates the fluid inlet passage from the fluid outlet passage;	The middle image, at right, shows that the seal separates the inlet passage (fan of red arrows) from the outlet passage (vertical and L-shaped red arrows). Because of the seal’s position and fluid-tight engagement with the housing insert, coolant must flow through the microchannels as indicated by the red arrows (bottom image) before reaching the outlet passage, rather than short circuiting and bypassing the microchannels by flowing directly from the inlet passage to the outlet passage.



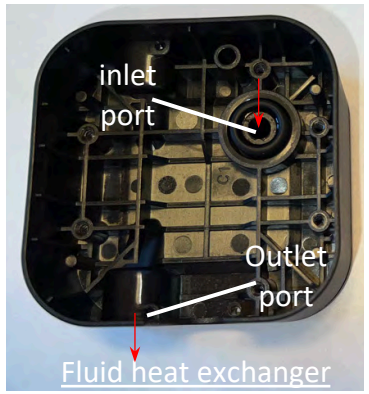


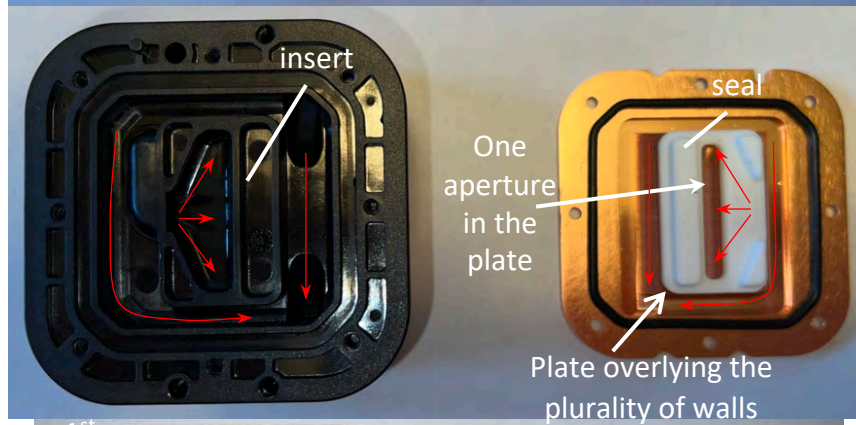


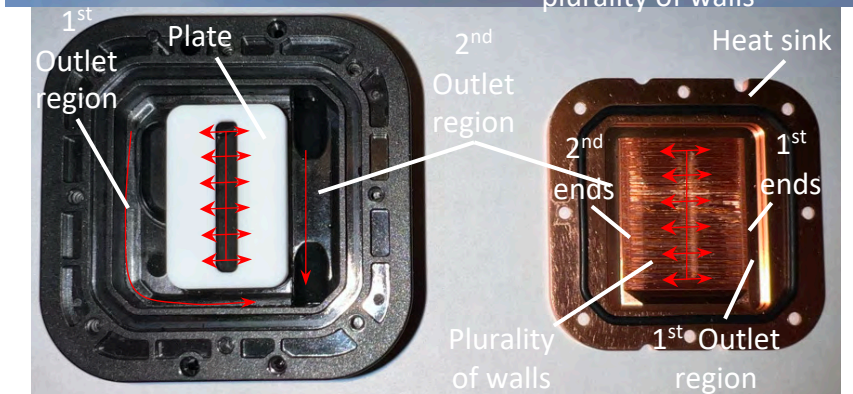


’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[d][3]. wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel,	As the red arrows in the lower image indicate, the coolant enters each of the selected ”plurality of microchannels” and bifurcates into two sub flows within each microchannel: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.
13[d][4]. wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends,	As indicated in the bottom image, the first outlet region receives one of the two sub flows (outwardly facing red arrows) with no intervening solid structure between it and the microchannel first ends. Similarly, as shown in the bottom image, the second outlet region receives the other of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel second ends.
13[d][5]. wherein the two sub flows recombine in the outlet passage.	As indicated in the bottom image at left, the two sub flows recombine in the outlet passage, e.g., near the outlet port, similar to a disclosed embodiment in the ’266 patent. See, e.g., ’266 patent, FIG. 2 (showing that the sub flows recombine near the outlet port 128).

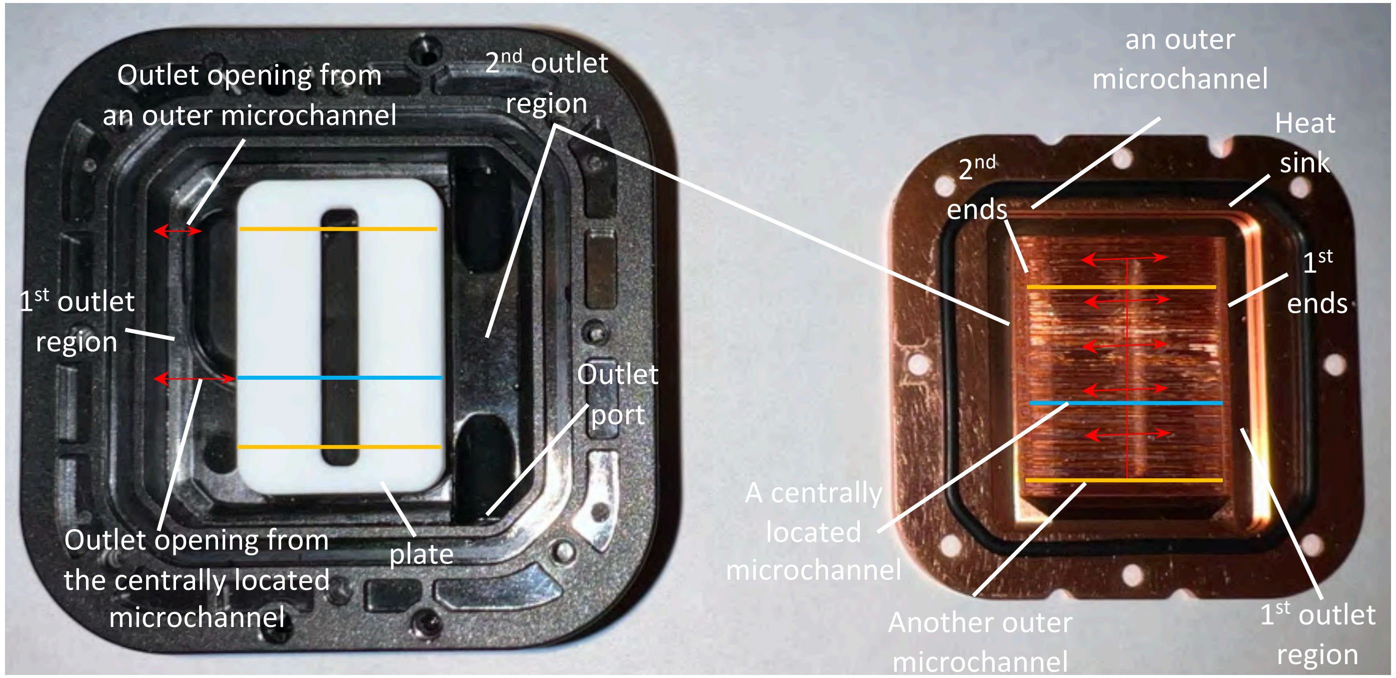






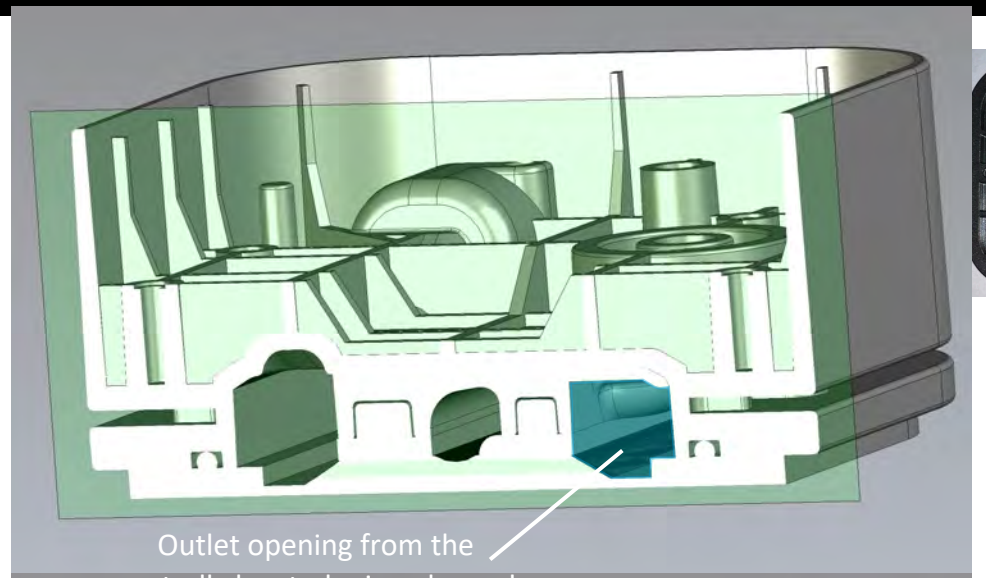
’266 Patent - Claim 15

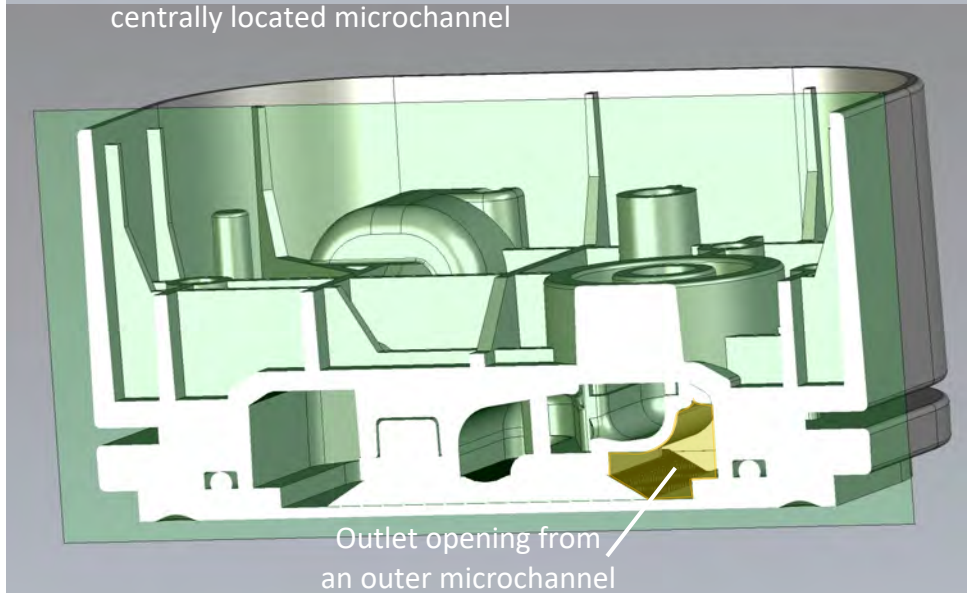
’266 Patent Claim	Comparison to Tamriel Device
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	The left image shows that the Tamriel Device includes at least two opposed outer microchannels (orange lines) and a centrally located microchannel (blue line) positioned between the opposed outer microchannels. (This is true regardless of whether the microchannels arise from the “split flow fins” or some other selected group of fins.) As well, each microchannel has an outlet opening to the first outlet region. As indicated by the red arrows superimposed on the left image, the outlet opening from the identified centrally located microchannel is larger than the outlet opening from at least one of the identified outer microchannels. [continued on next page]

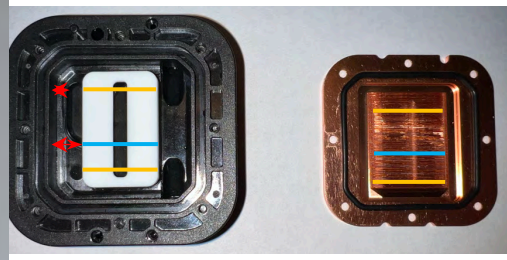


’266 Patent - Claim 15

’266 Patent Claim	Comparison to Tamriel Device
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	The top left image and the bottom left image are cross-sectional views taken parallel the identified centrally located microchannel and the “at least one of the outer microchannels” identified on the previous page. The blue shaded area in the top left image shows the outlet opening from the centrally located microchannel. The orange shaded area in the bottom left image shows the outlet opening from the identified “at least one of the outer microchannels.” At right, a comparison of the areas of the outlet openings is shown. In the middle right image, the areas of the outlet openings are superimposed on each other. The image at lower right shows the area of the outlet opening from the centrally located microchannel that remains when the area of the opening from the outer microchannel is subtracted or removed. In other words, the lower right image shows that the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.







Comparison of outlet openings from the centrally located microchannel and at least one outer microchannel

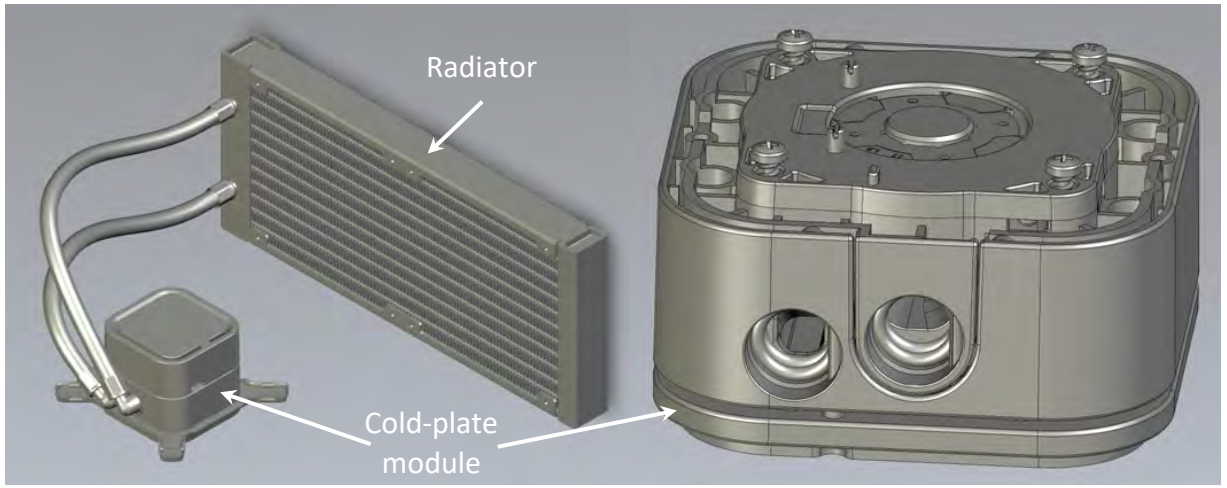
The area by which the outlet opening from the centrally located microchannel is larger than the outlet opening from the identified outer microchannel

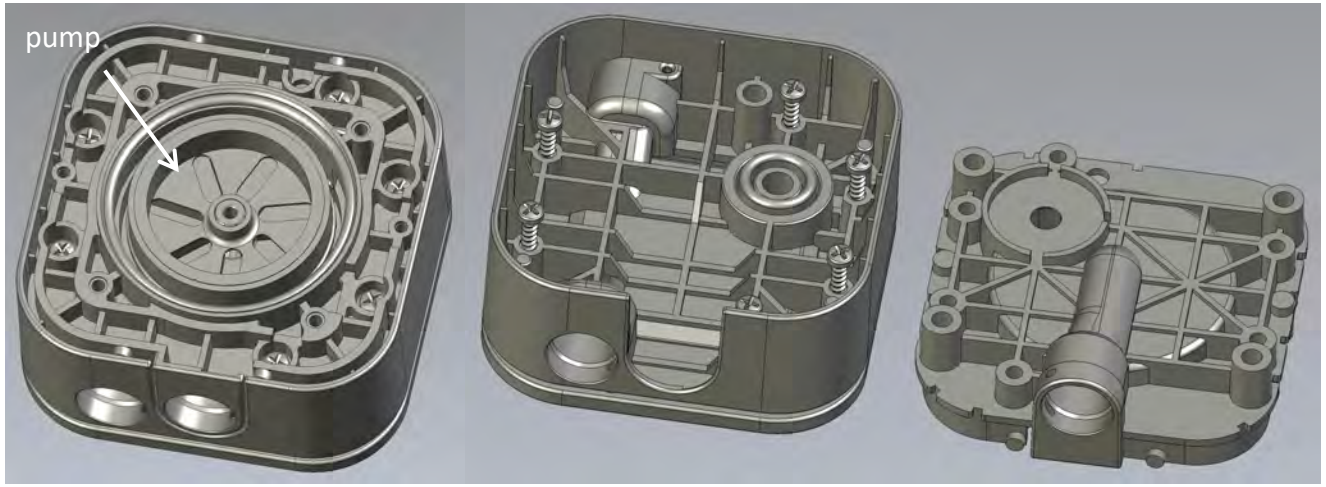
Exhibit D-8

CoolIT's TAMRIEL Device (represented by CAD files)

’266 Patent - Claim 1

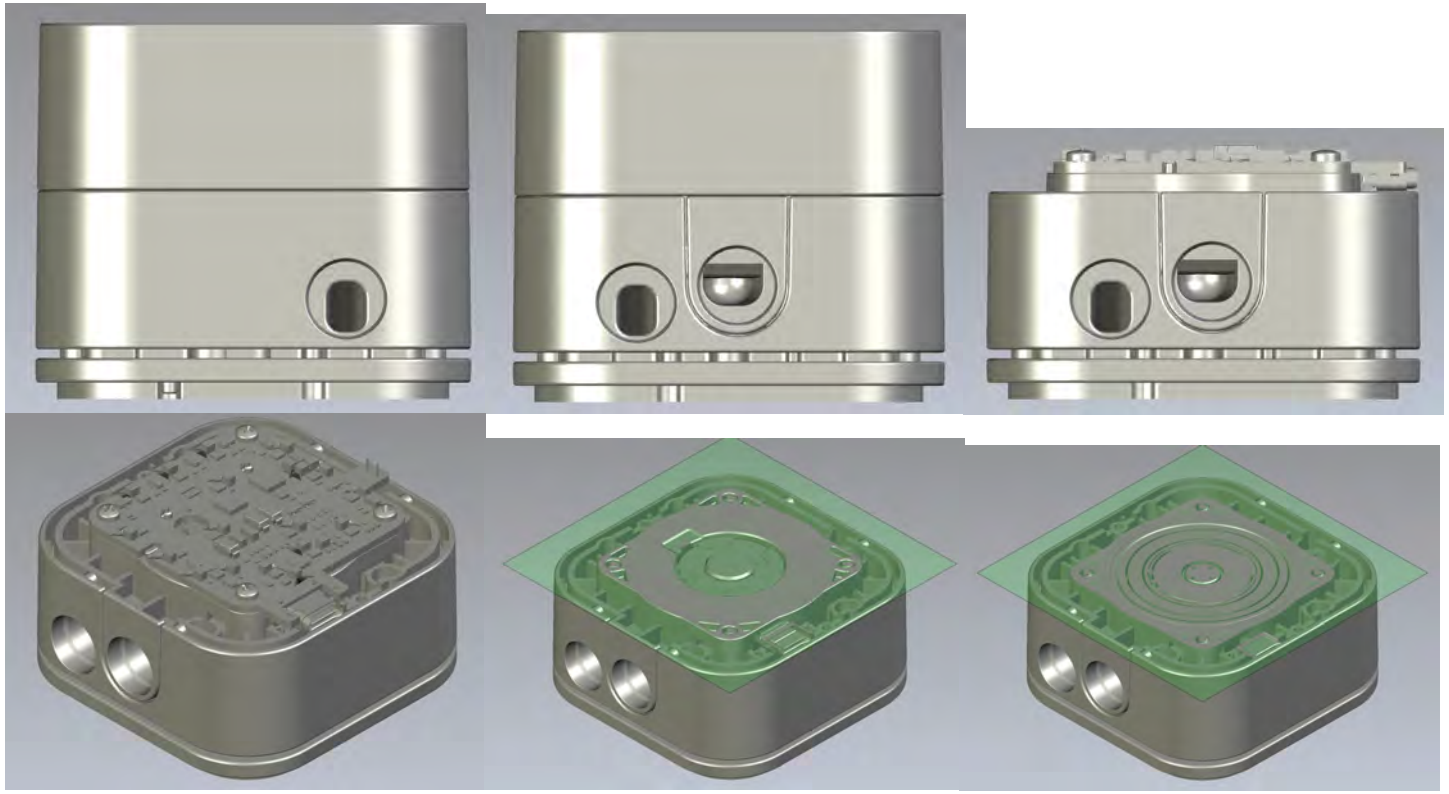
’266 Patent Claim	Comparison to Tamriel Device
1. A heat exchange system comprising:	The Tamriel Device is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).





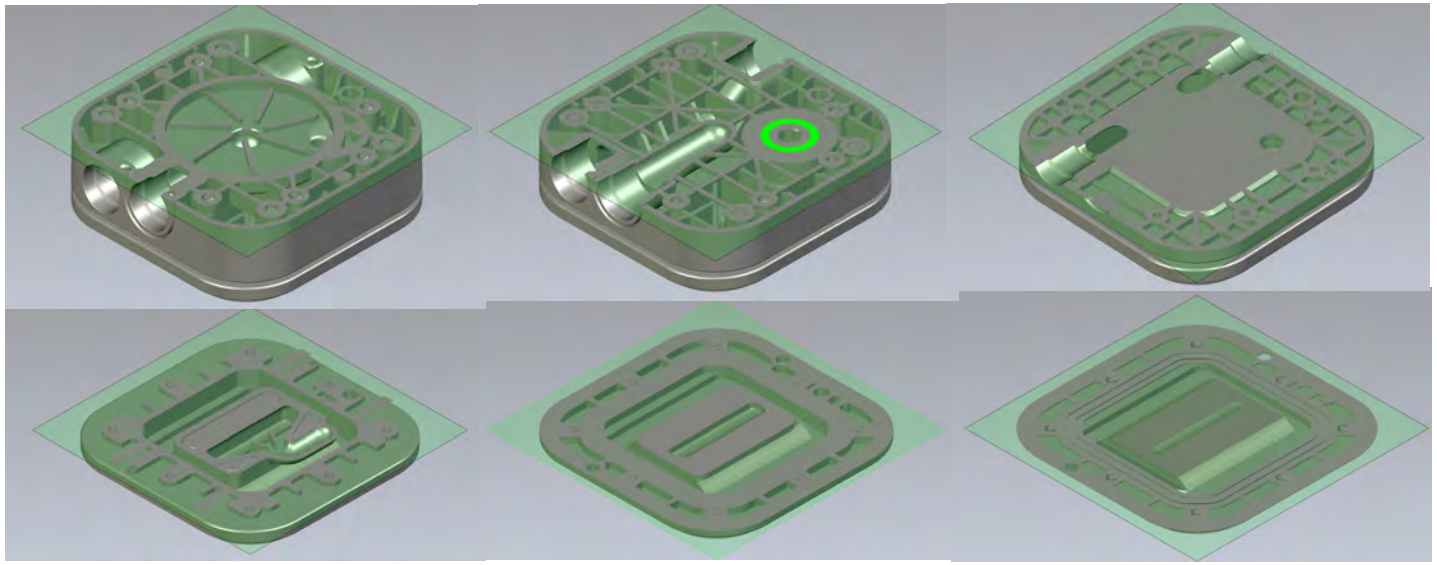
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1. A heat exchange system comprising:	The Tamriel Device is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



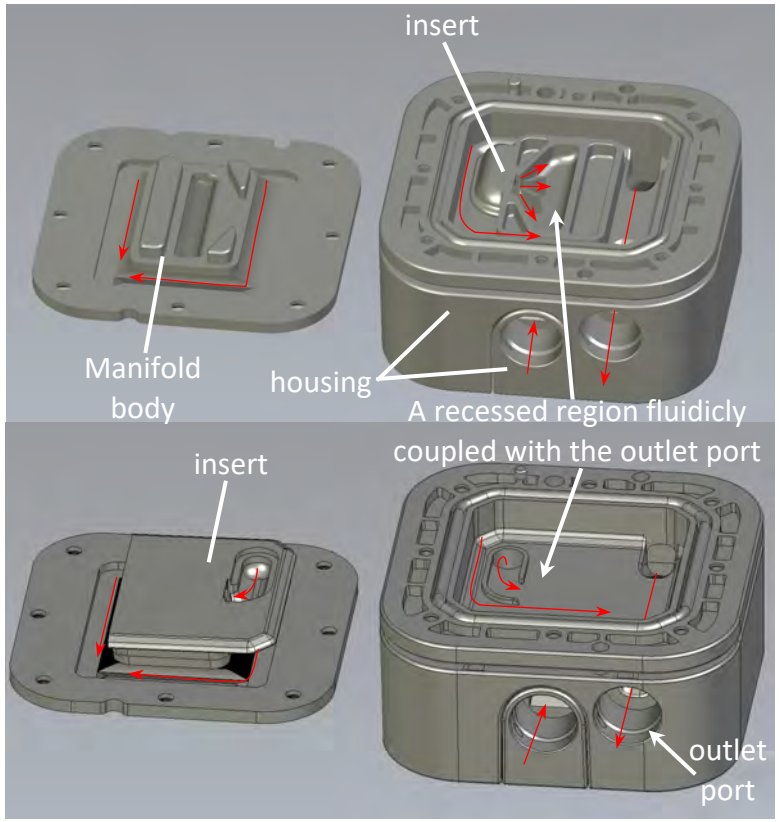
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1. A heat exchange system comprising:	The Tamriel Device is a heat exchange system for cooling electronic devices. It includes a cold-plate module having a pump and a remote radiator for rejecting heat absorbed by the cold-plate module. The pump circulates liquid coolant from the cold-plate module to the radiator and back. The liquid coolant is heated as it passes through the cold-plate module to the radiator and carries the absorbed heat to the radiator, where the heat is rejected, cooling the liquid coolant. The cool coolant then returns to the cold-plate module to further cool the heat-dissipation device (e.g., a CPU, GPU, etc.).



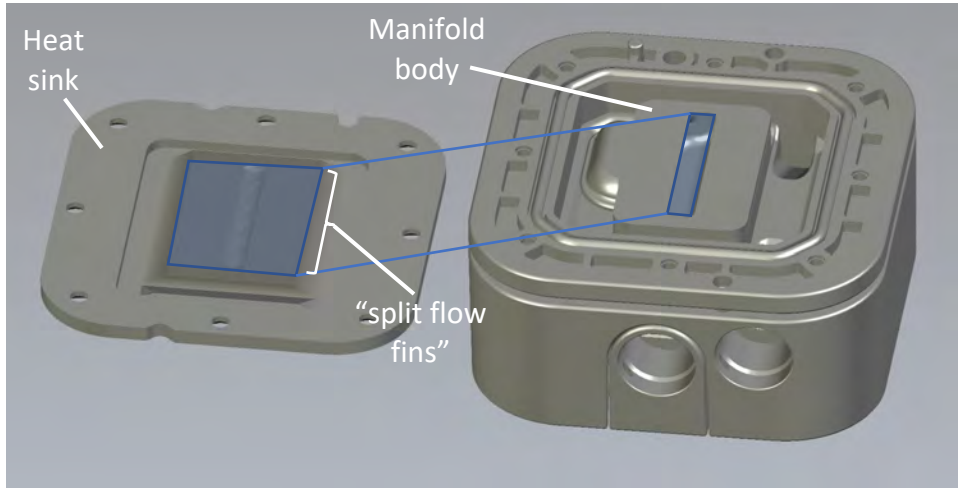
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[a]. a housing defining a recessed region and an outlet port fluidicly coupled with the recessed region;	The Tamriel Device device defines a recessed region and an outlet port fluidicly coupled with the recessed region. The images at top right and bottom right show the housing, together with an outlet port. In both images, the identified recessed region sits below and is set back from a perimeter of the identified recessed region. As shown at top right, the assembled housing defines such a recess. As shown at bottom right (e.g., when the housing insert shown at lower right is removed), the housing defines a deeper recess (blue shaded area at lower left). The insert at upper right (and lower left) rests within the recess shown at lower right. An outlet port defined by the housing (shown upper and lower right) receives coolant (indicated by red arrows) that flows through each of the above-identified recessed regions as the coolant passes through the Tamriel Device’s cold-plate module. Thus, regardless of which recessed region is selected, the outlet port is fluidicly coupled with the selected recessed region.



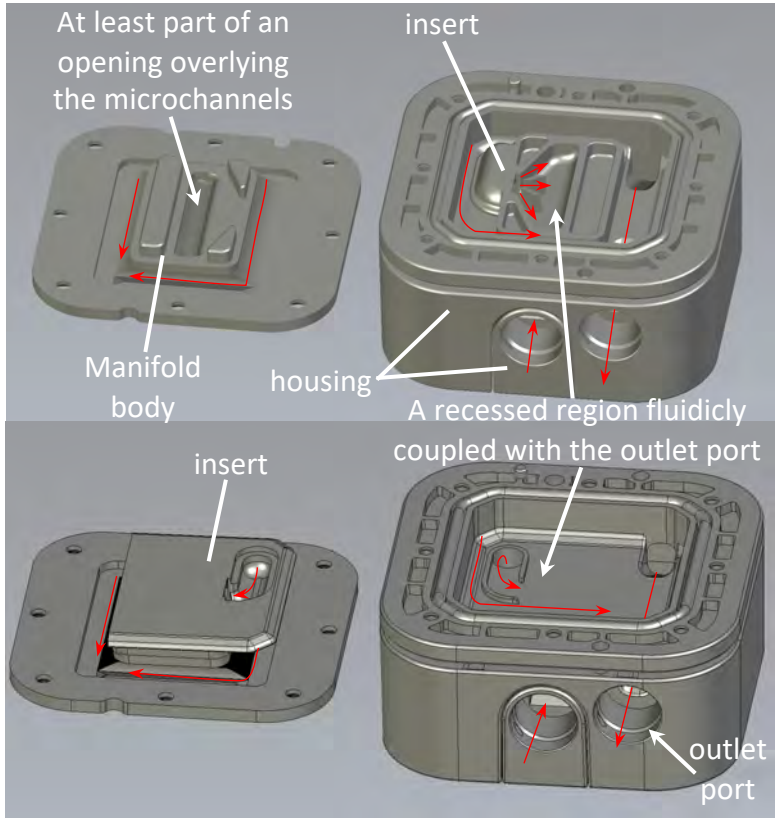
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[b]. a heat sink having a plurality of juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins;	The heat sink of the Tamriel Device device literally includes more than one fin, and this group of fins is spaced apart from each other without any intervening solid structure between them. And, the spacing between the fins define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the Tamriel Device satisfies the plurality of juxtaposed fins limitation. For example, the Tamriel Device device has a heat sink with a plurality of juxtaposed fins (e.g., each fin in the plurality of fins has no intervening solid structure between it and the next fin; right, shaded blue). The spacing between each pair of fins defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several spaced apart fins define a plurality of microchannels that correspond to the plurality of juxtaposed fins. As shown to the right, a group of juxtaposed fins and the corresponding plurality of microchannels are positioned beneath the opening (left, blue rectangle) in the manifold body. Each fin in this group is exposed directly to liquid flowing from the opening through the plate. These fins are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “juxtaposed fins defining a corresponding plurality of microchannels between adjacent fins.”



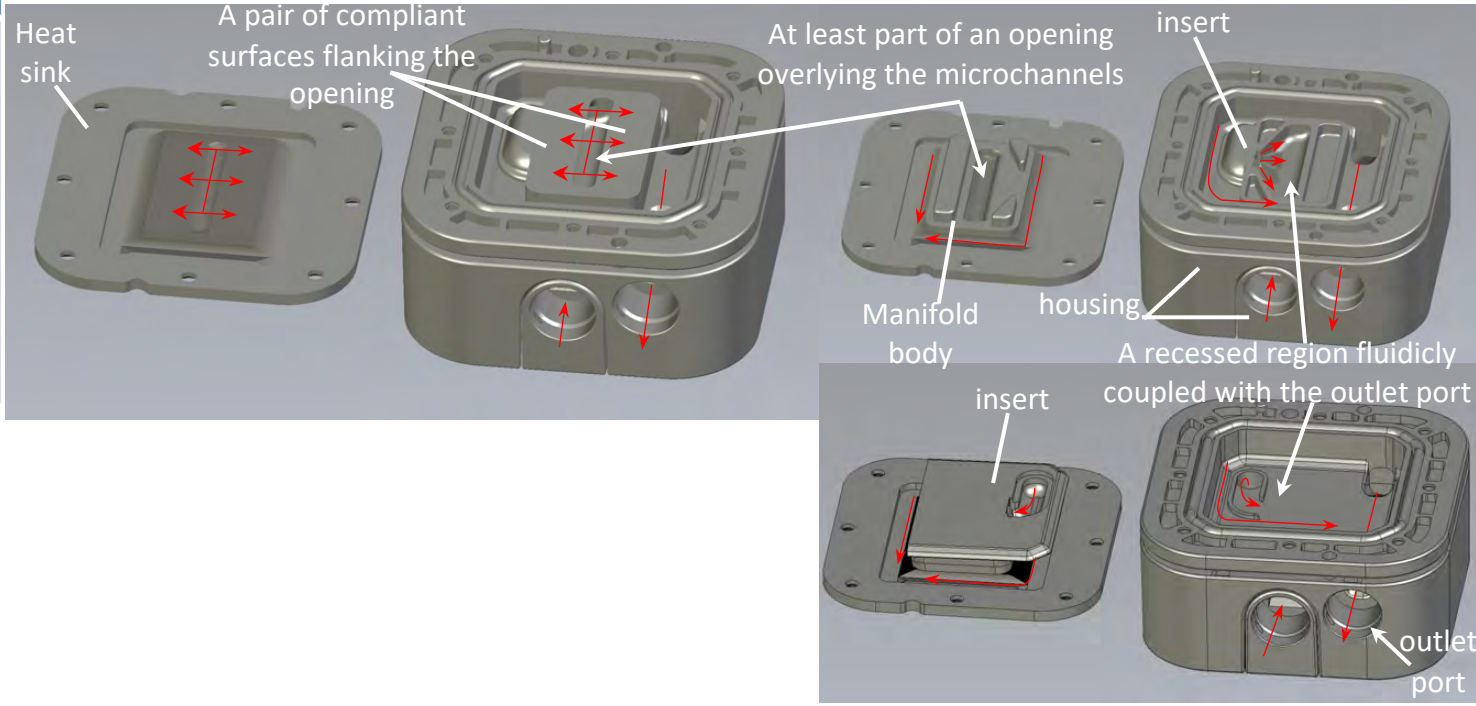
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[c]. a manifold body at least partially defining an opening overlying the microchannels,	As shown at upper left, the Tamriel Device device includes a manifold body that overlies the microchannels, regardless of which definition of “plurality of fins” is used. As shown at upper left, the manifold body defines at least part of an opening positioned over the microchannels. This is shown at lower right (note that the fins defining the microchannels are visible through the manifold body).



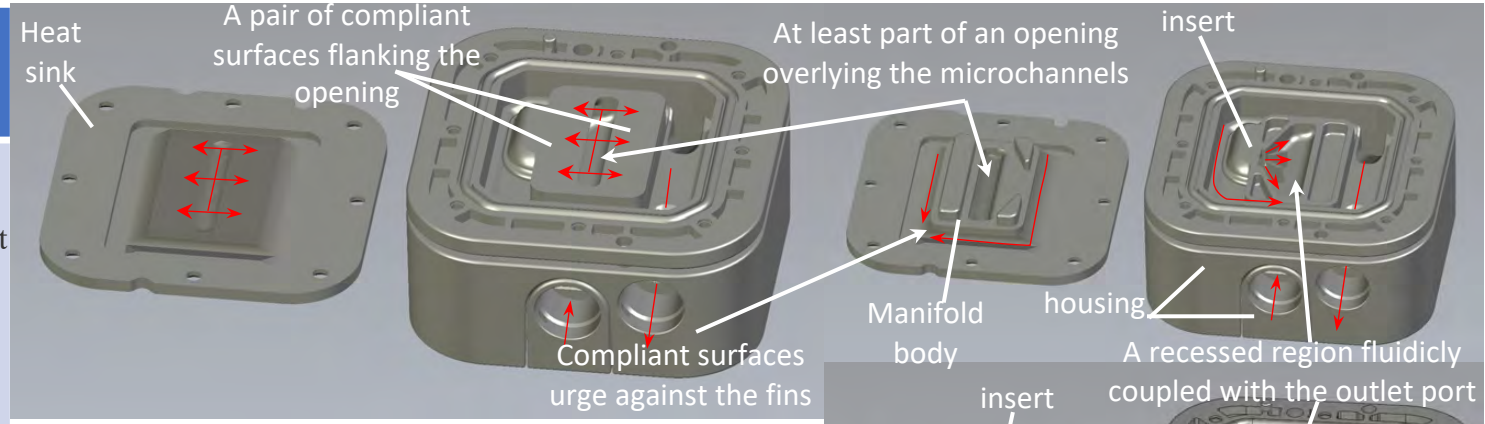
’266 Patent - Claim 1

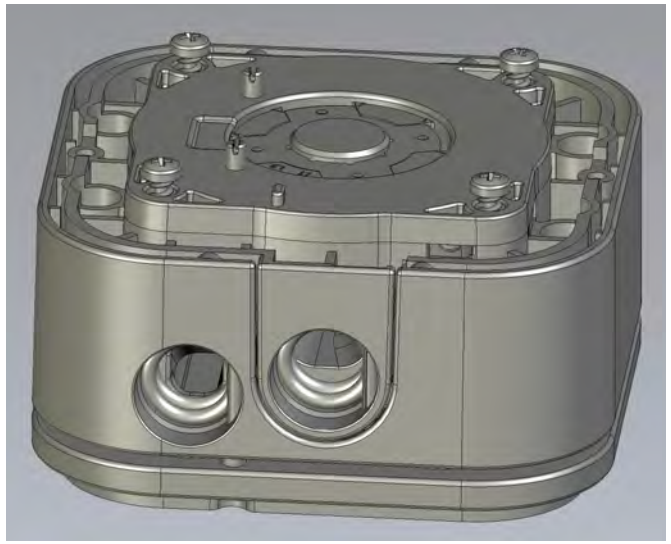
’266 Patent Claim	Comparison to Tamriel Device
1[d]. wherein the manifold body defines a pair of compliant surfaces flanking the opening,	At upper left, the Tamriel Device’s device’s pair of compliant surfaces made of a compliant polymer (e.g., rubber) are shown flanking the opening.



’266 Patent - Claim 1

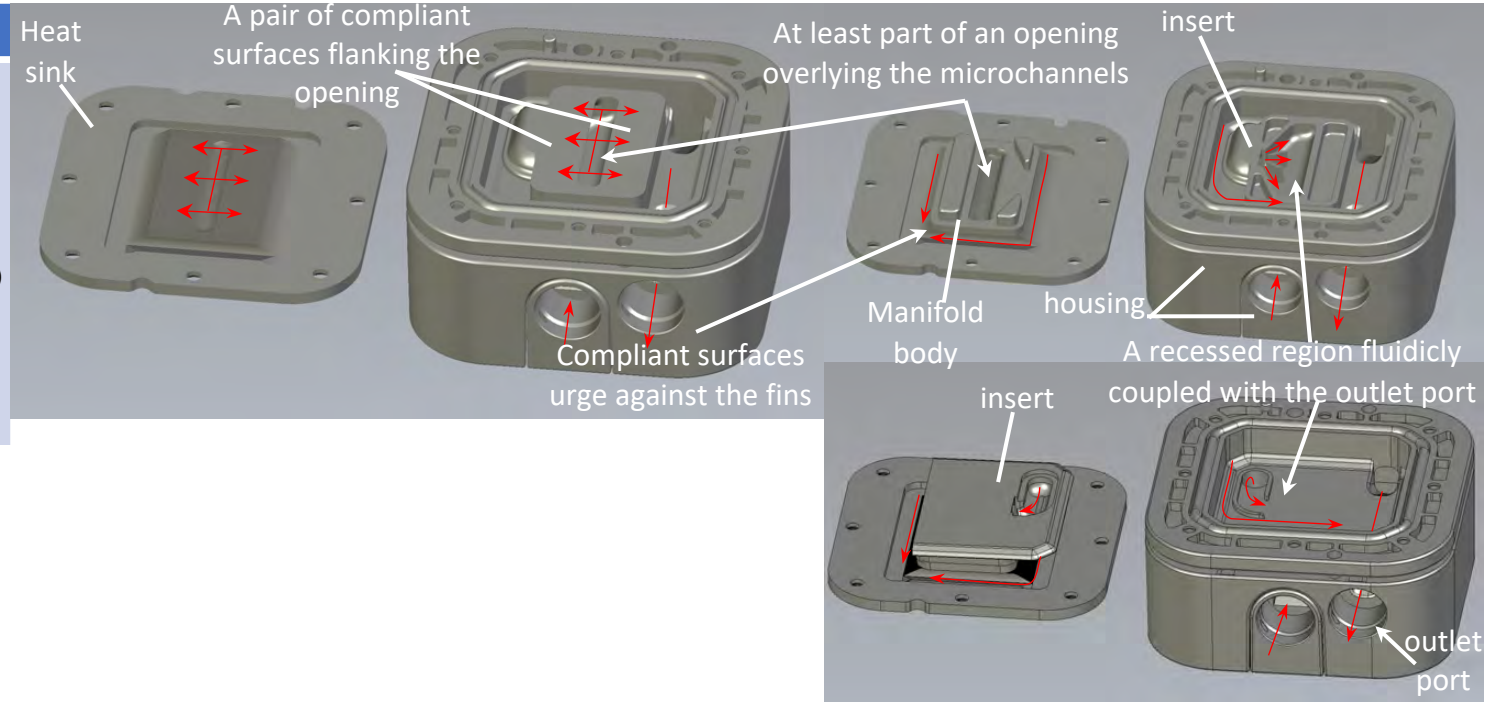
’266 Patent Claim	Comparison to Tamriel Device
1[e]. wherein the compliant surfaces urge against the fins, defining a flow boundary of the microchannels,	When assembled as shown immediately below, the Tamriel Device’s cold-plate module compresses the manifold body (at left in top right image) between the heat sink and the housing, which urges the compliant surfaces against the fins and defines a flow boundary of the microchannels. The flow boundary inhibits coolant from leaking out of the microchannels, which would otherwise deteriorate cooling performance.





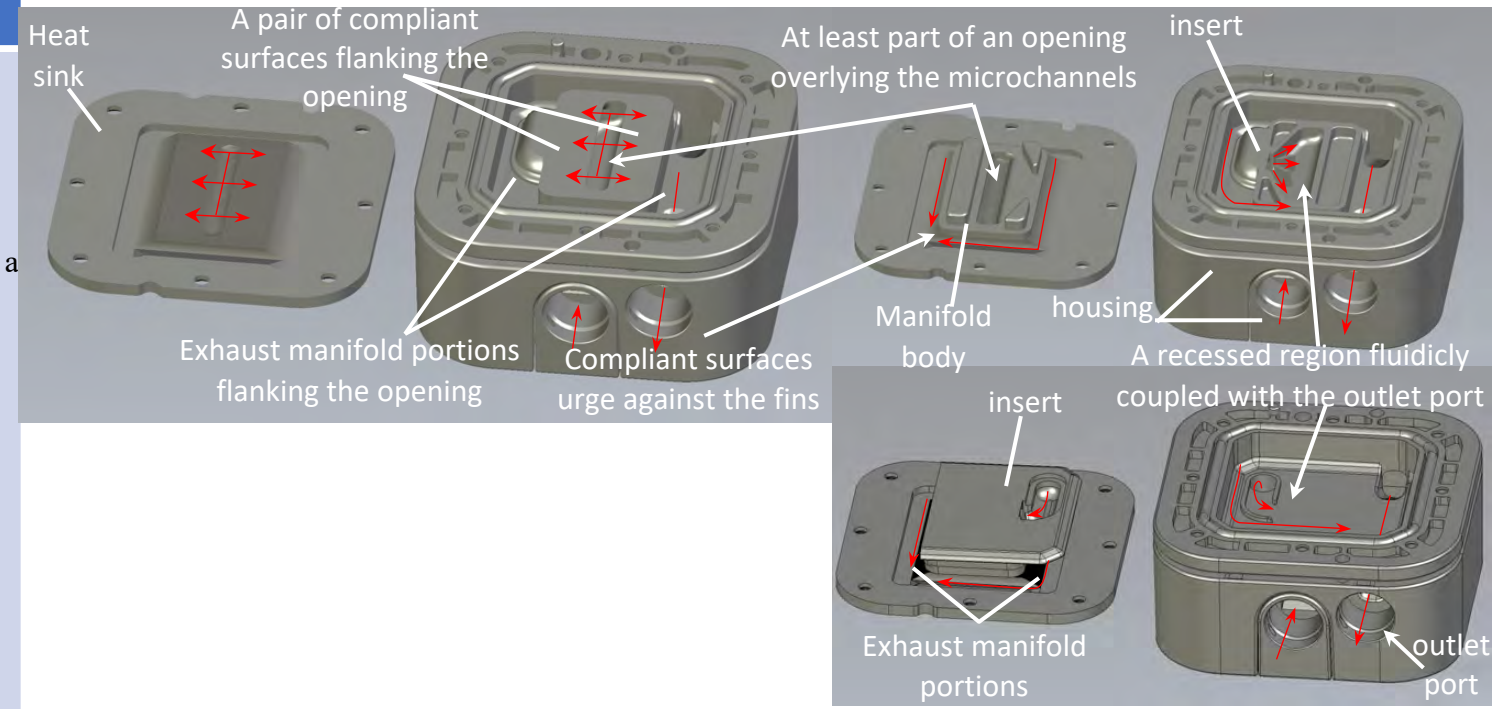
’266 Patent - Claim 1

’266 Patent Claim	Comparison to Tamriel Device
1[f]. wherein the opening extends transversely relative to the fins and is configured to distribute a working fluid among the microchannels,	As the upper (far left, center left and center right) images show, the opening extends transversely (e.g., across the tops of) the fins. The central red line (upper left and center left) lies within the opening (e.g., as a longitudinal axis of the opening) and is superimposed over the fins in the upper left image to indicate a flow of a working fluid being distributed among the microchannels.



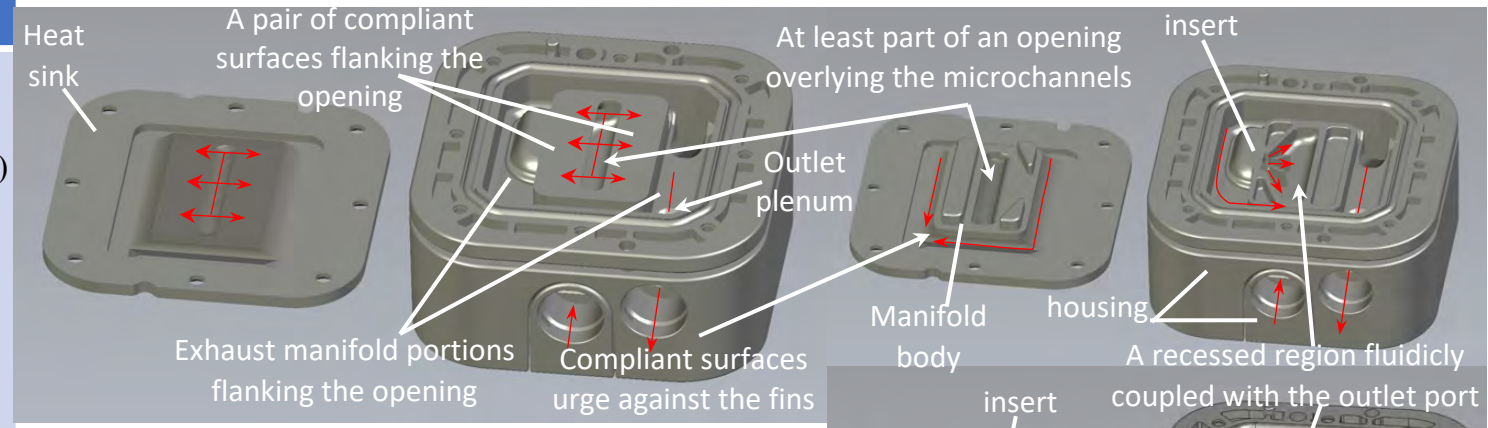
’266 Patent - Claim 1

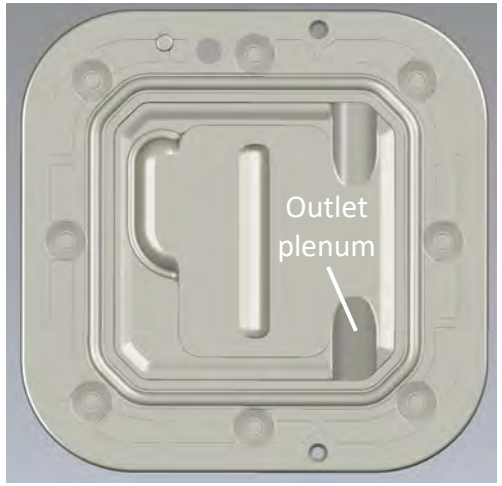
’266 Patent Claim	Comparison to Tamriel Device
1[g]. wherein the manifold body partially occupies the recessed region of the housing, leaving a pair of opposed portions of the recessed region unfilled, defining opposed exhaust manifold portions flanking the opening and being configured to receive the working fluid from the microchannels, and	The the top, center-left image shows the manifold body positioned within and thus partially occupying the recessed region of the housing (e.g., shown at far right top and bottom), regardless of which recessed region defined by the housing is selected. In leaving a pair of opposed portions of the selected recessed region unfilled, the manifold body defines opposed exhaust manifold portions flanking the opening, as shown at top, left of center. The outwardly directed red arrows shown at upper left indicate a flow of the working fluid through the microchannels. The outwardly directed red arrows are superimposed on the image at center left, showing that the outwardly directed flows of the working fluid through the microchannels enter the opposed exhaust manifold portions. Thus, the opposed exhaust manifold portions flanking the opening are configured to receive the working fluid from the microchannels, as claimed.



’266 Patent - Claim 1

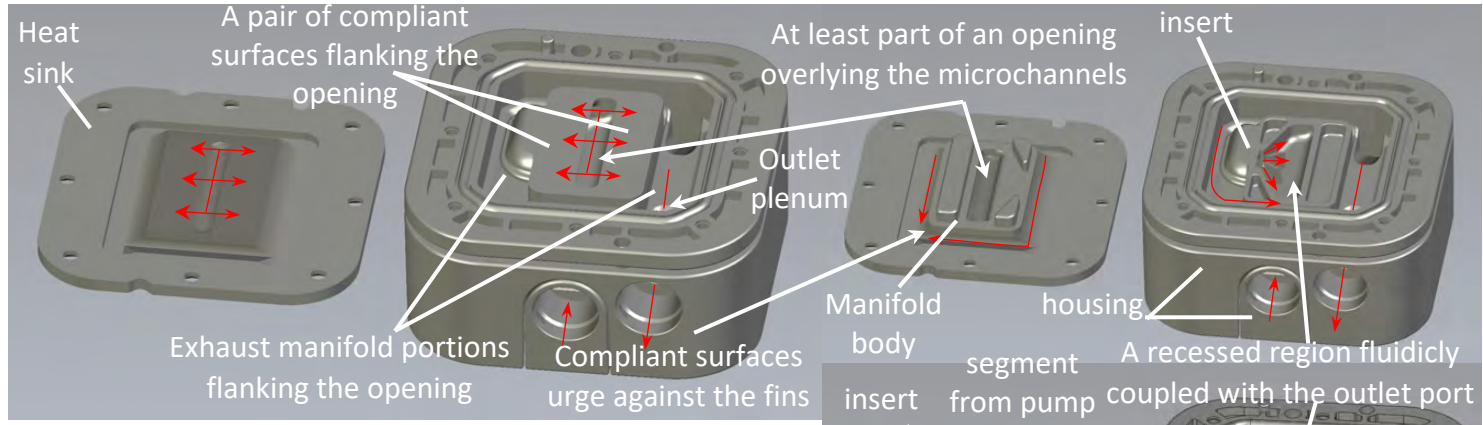
’266 Patent Claim	Comparison to Tamriel Device
1[h]. wherein the housing further defines an outlet plenum configured to receive the working fluid from the exhaust manifold portions and to convey the working fluid to the outlet port.	The image at lower left (and at top, center-left) shows an outlet plenum that receives the working fluid from the exhaust manifold portions. The outlet plenum conveys the working fluid to the outlet port.

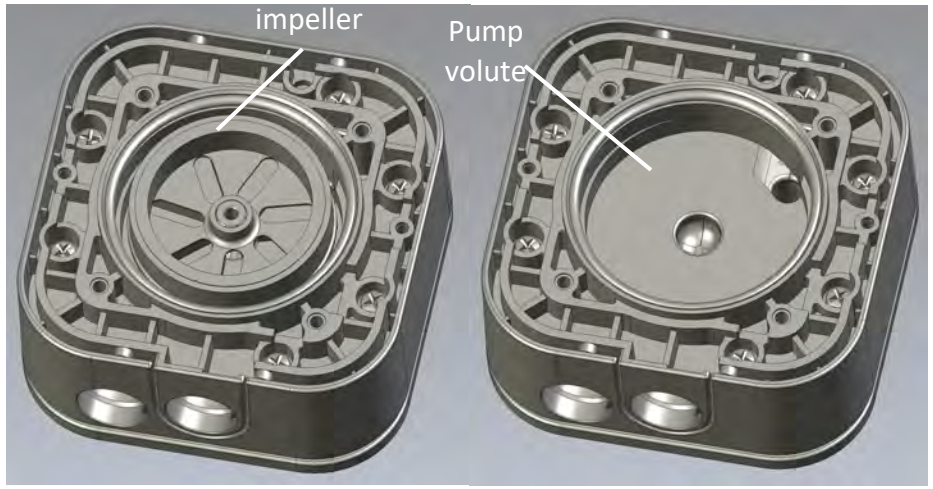




’266 Patent - Claim 2

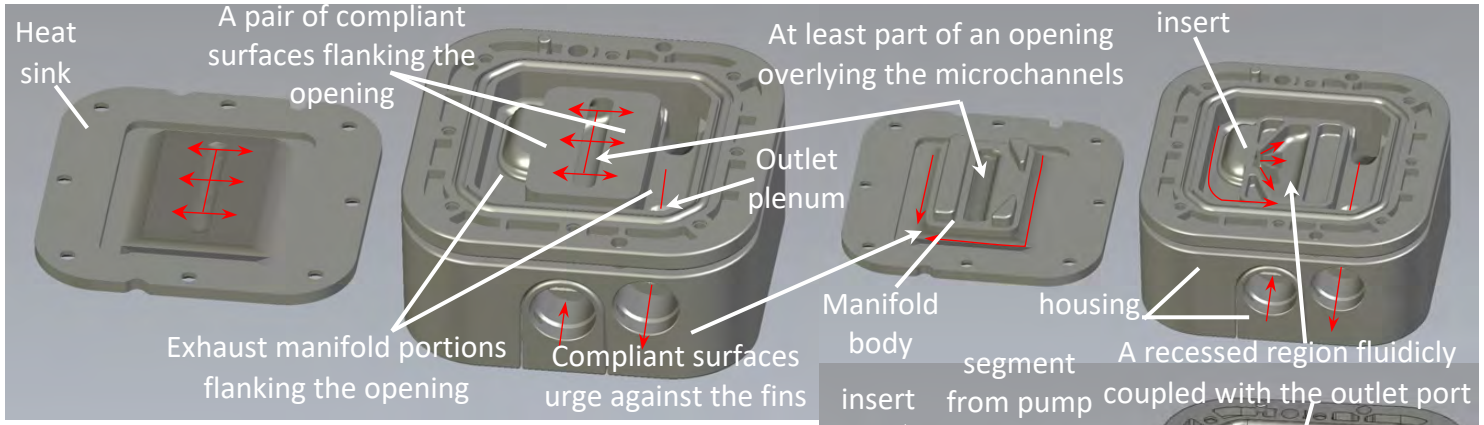
’266 Patent Claim	Comparison to Tamriel Device
2. The heat exchange system according to claim 1, wherein the housing defines a pump volute and a segment of a flow path, the segment configured to convey the working fluid from the pump volute to the opening at least partially defined by the manifold body, the heat exchange system further comprising an impeller positioned in the pump volute and configured to urge the working fluid along the flow path.	The lower right image shows that the assembled housing defines a segment of a flow path (indicated by curved red arrow) configured to convey the working fluid from the pump volute to the opening defined in part by the manifold body. The lower images show the housing defines a pump volute (lower right). At lower left, an impeller is shown positioned in the pump volute.

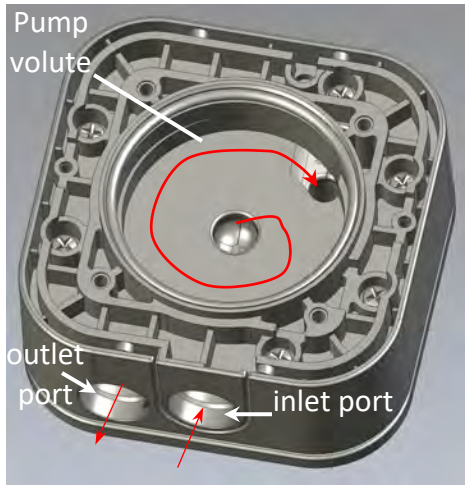




’266 Patent - Claim 5

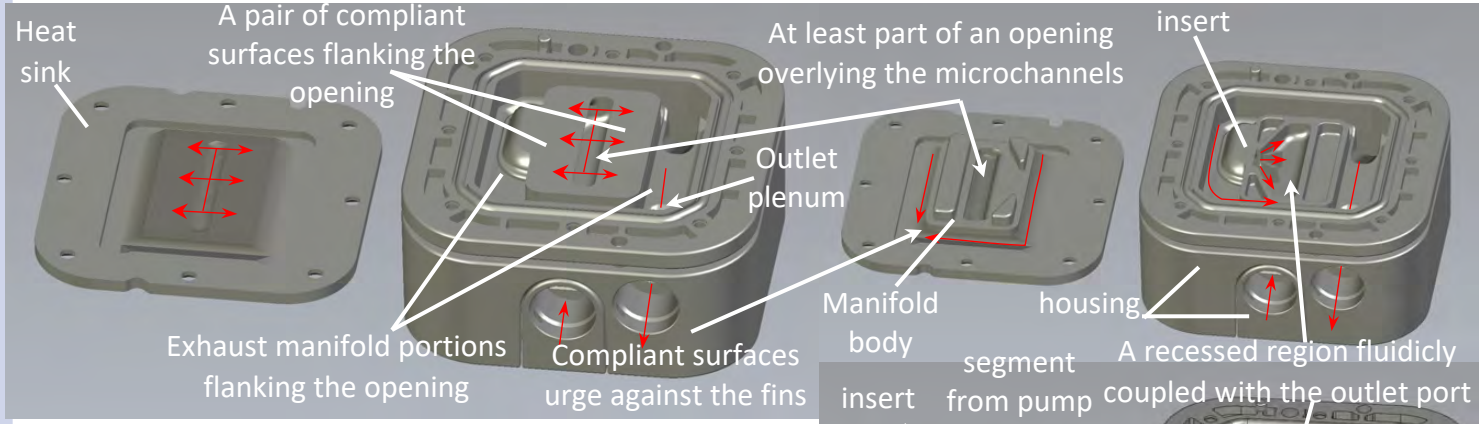
’266 Patent Claim	Comparison to Tamriel Device
5. The heat exchange system according to claim 2, wherein the housing defines an inlet port, wherein the flow path extends from the inlet port to the outlet port and is configured to convey the working fluid from the inlet port through the pump volute, the manifold body, the microchannels, the opposed exhaust manifold portions, and the outlet plenum to the outlet port.	The lower left image shows an inlet port and the outlet port. The red arrows indicate the path that the working fluid follows through the cold-plate module of the Tamriel Device. As indicated at lower left, the fluid enters from the inlet port and flows through a channel into an entrance to the pump volute. On entering the pump volute (lower left), the spinning impeller (not shown) imparts momentum to the working fluid, which exits the pump volute along the indicated segment of the flow path. Referring to the lower right image, the flow from the pump volute passes along the segment from the pump volute to the opening. At upper right, the flow path extends through the diffuser of the insert, through the manifold body (top center left and right) and enters the microchannels (upper left image). The opposed exhaust manifold portions (top, center-left image) collect the working fluid from the microchannels and the working fluid follows the flow path into the outlet plenum (curved red arrows in top right images and at lower right), which conveys the working fluid to the outlet port (lower left and lower right).

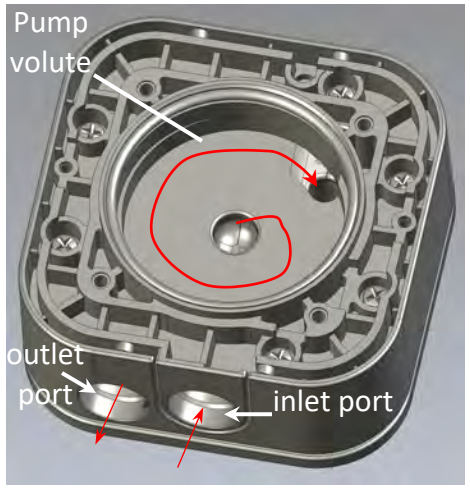




’266 Patent - Claim 9

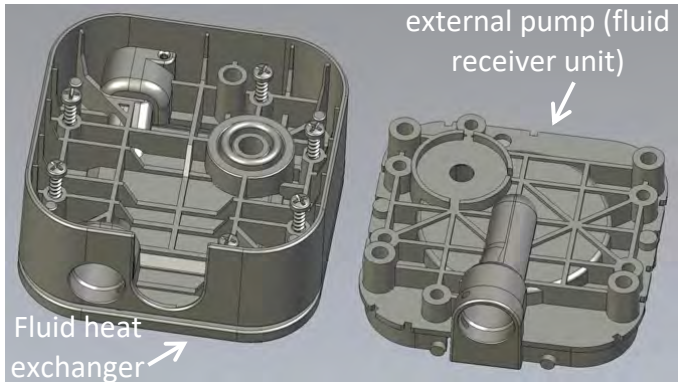
’266 Patent Claim	Comparison to Tamriel Device
9. The heat-exchange module according to claim 1, wherein a flow of the working fluid defines a flow path, wherein the flow path is distributed among the plurality of microchannels, and, within each microchannel, the flow path bifurcates into a pair of opposed sub-flow paths directed away from each other.	Coolant flow through the Tamriel Device defines a flow path. Red arrows superimposed on the images at right indicate the flow path. After exiting the pump, the coolant passes into the opening overlying the microchannels (indicated by central, outwardly fanning red arrows in the top left and top, center-left images) then into the microchannels. As the coolant flows over top the microchannels, the coolant flow (and thus the path the flow defines) is distributed among the plurality of microchannels, as indicated by the red arrows superimposed on the top, center-left image. The coolant flow enters each of the microchannels and, within each microchannel, splits (or bifurcates) into outwardly directed sub-flows (indicated by the outwardly directed red arrows superimposed on the upper left image). Thus, the coolant flow defines a flow path that bifurcates within each microchannel into a pair of opposed sub-flow paths directed away from each other, as claim 9 recites

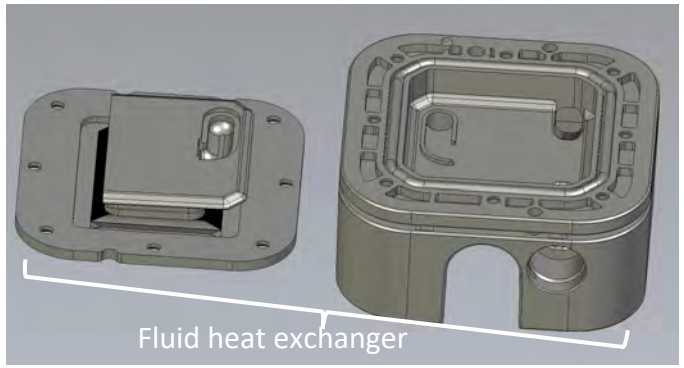


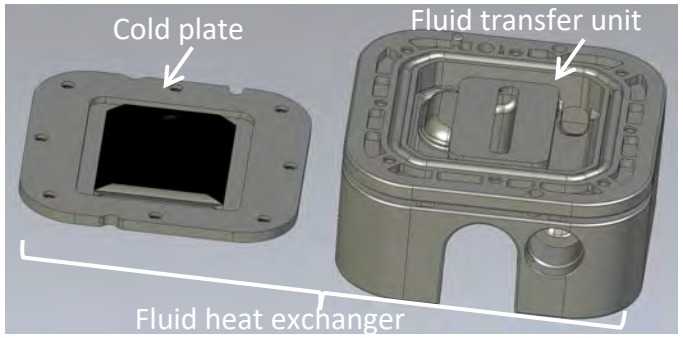


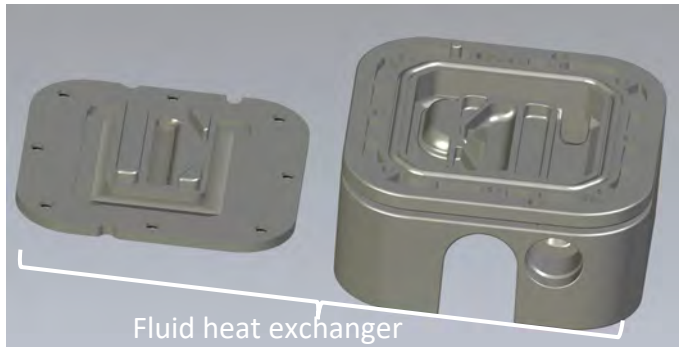
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The Tamriel Device is a modular heat-exchange system having a fluid receiver unit, a fluid transfer unit, and a cold plate coupled with the fluid transfer unit. In the embodiment shown, the fluid receiver unit includes a pump and is separable from the fluid transfer unit and the cold plate. The fluid transfer unit and the cold plate together form a fluid heat exchanger. The assembled fluid transfer unit and cold plate includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the Tamriel Device has a cold plate and a housing that are separable from the fluid receiver unit which contains the pump. Thus, the Tamriel Device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component."



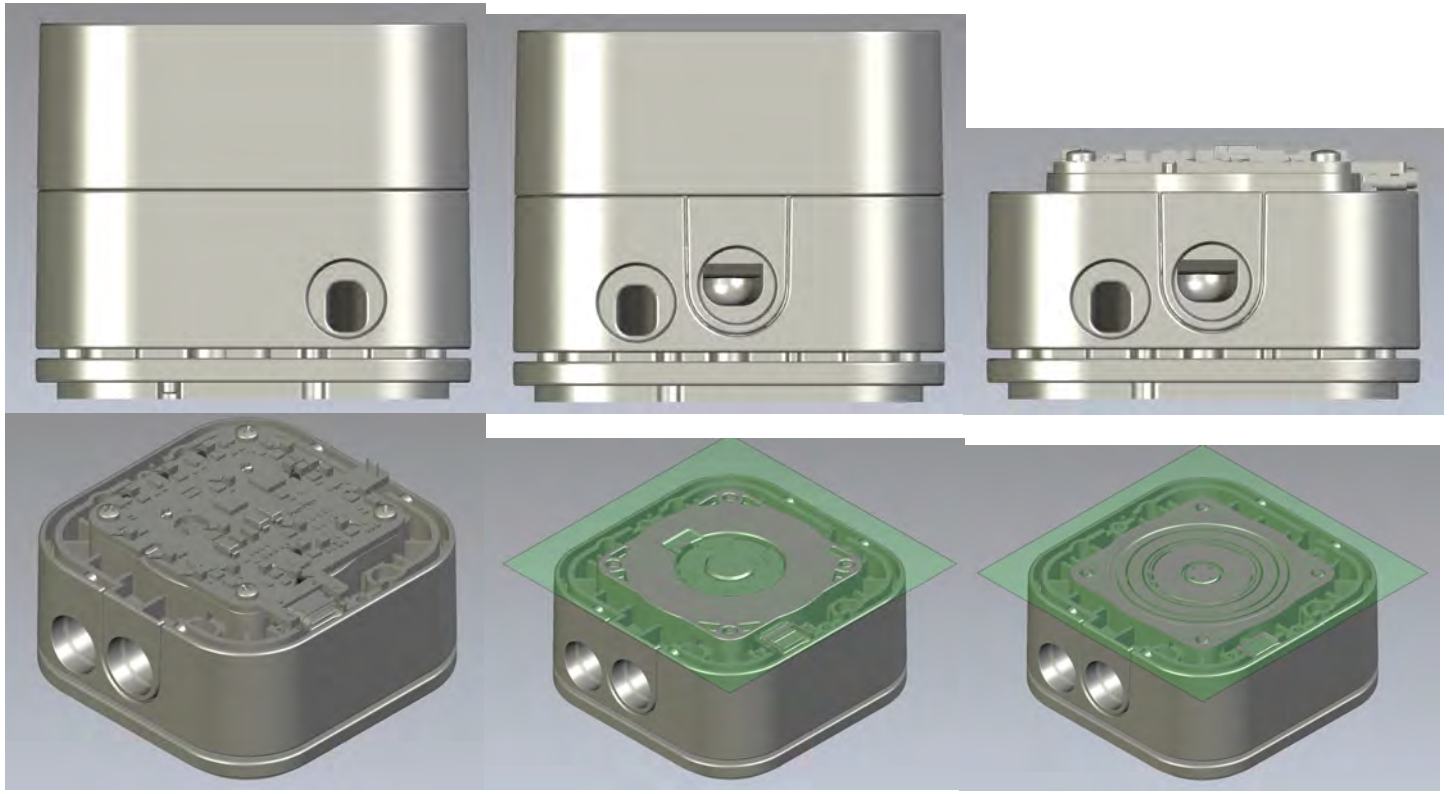






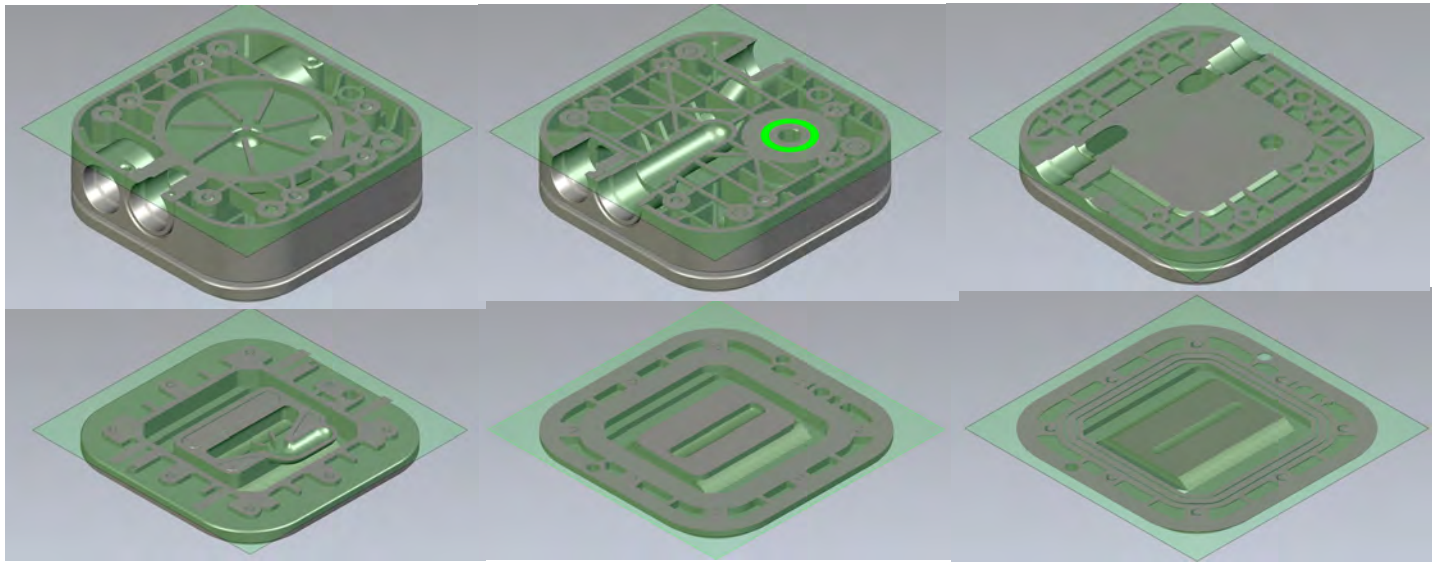
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The Tamriel Device is a modular heat-exchange system having a fluid receiver unit, a fluid transfer unit, and a cold plate coupled with the fluid transfer unit. In the embodiment shown, the fluid receiver unit includes a pump and is separable from the fluid transfer unit and the cold plate. The fluid transfer unit and the cold plate together form a fluid heat exchanger. The assembled fluid transfer unit and cold plate includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the Tamriel Device has a cold plate and a housing that are separable from the fluid receiver unit which contains the pump. Thus, the Tamriel Device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component."



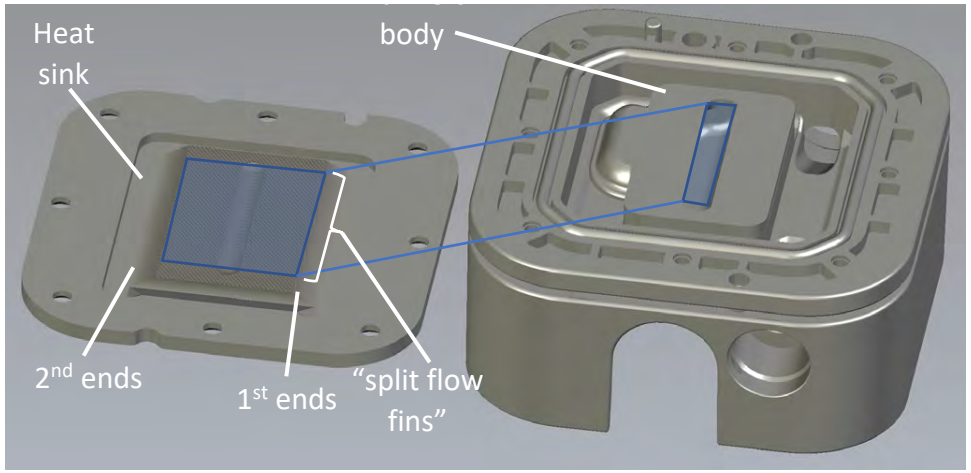
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13. A fluid heat exchanger for cooling an electronic device, the heat exchanger comprising:	The Tamriel Device is a modular heat-exchange system having a fluid receiver unit, a fluid transfer unit, and a cold plate coupled with the fluid transfer unit. In the embodiment shown, the fluid receiver unit includes a pump and is separable from the fluid transfer unit and the cold plate. The fluid transfer unit and the cold plate together form a fluid heat exchanger. The assembled fluid transfer unit and cold plate includes a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component. For example, the Tamriel Device has a cold plate and a housing that are separable from the fluid receiver unit which contains the pump. Thus, the Tamriel Device includes “a component that transfers heat from a heat source to a cooling liquid circulated by a pump that is external to the component."



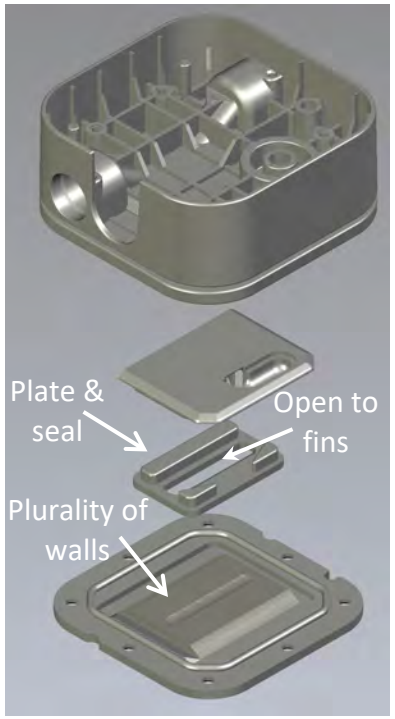
’266 Patent - Claim 13

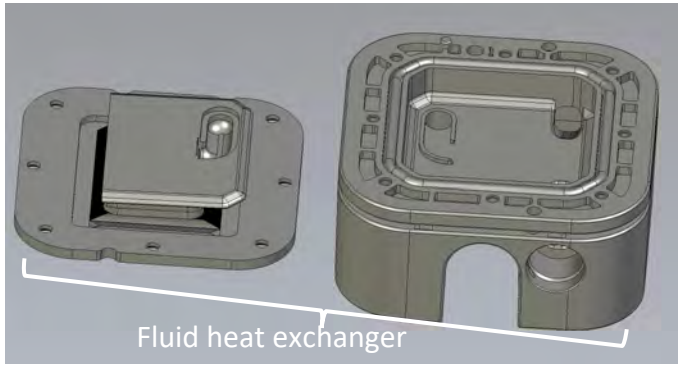
’266 Patent Claim	Comparison to Tamriel Device
13[a]. a plurality of walls defining a corresponding plurality of microchannels, wherein each microchannel extends from a first end to a second end;	The Tamriel Device literally includes more than one wall, and this group of walls is spaced apart from each other, defining channels. And, the spacing between the walls define a corresponding plurality of “channels with widths up to 1 millimeter.” Thus, the Tamriel Device satisfies the plurality of walls limitation. For example, the Tamriel Device has several spaced-apart walls (e.g., right, shaded blue). The spacing between each pair of walls defines a microchannel (e.g., they define a “channel with a width up to 1 millimeter.”). Accordingly, the several walls define a plurality of microchannels that correspond to the walls. As shown to the right, a group of walls and microchannels (left) is positioned beneath the opening (right) in the plate. Each wall in this group is exposed directly to liquid flowing from the opening through the plate. These walls are referred to herein as “split flow fins.” Thus, the “split flow fins” constitute a claimed “plurality of walls.” Each microchannel extends from a first end to a second end.

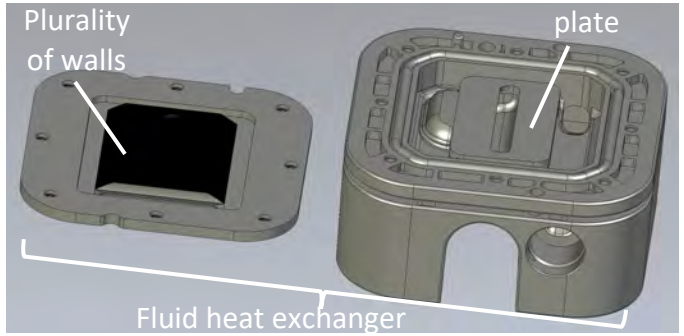


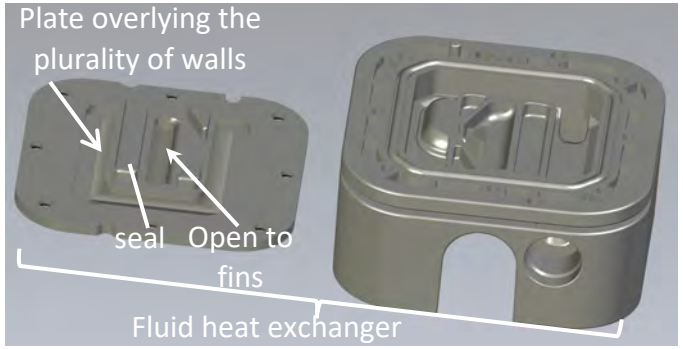
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[b]. a plate overlying the walls; and a seal, wherein the seal is a portion of the plate;	The exploded view at top left shows a plate that overlies the plurality of walls, whether the plurality of walls is identified as the “split-flow fins” or another selected group of fins containing more than one fin. The lower right image shows the plate overlying the fins, as well as the seal being a separately identifiable structure that is formed as a unitary construct with the plate (upper left image). Thus, the seal constitutes a portion of the plate as claimed. See, ’266, col. 12:43-44 (“Seal 230 may be installed as a portion of the plate or separately.”); FIGS. 5 and 6 (illustrating the seal 230 as being structure that is continuous and monolithic with the plate 240 and tabs 242).



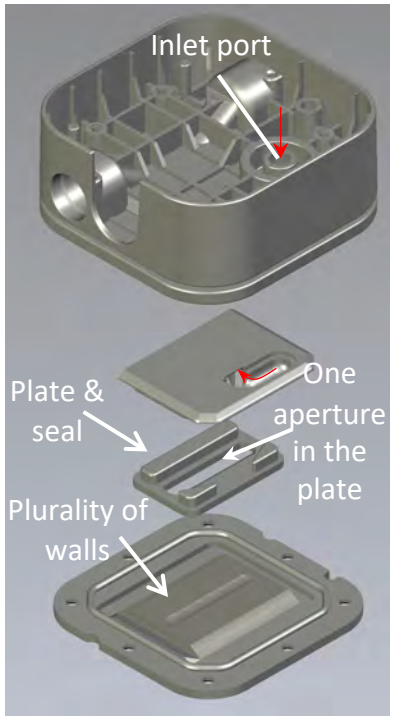


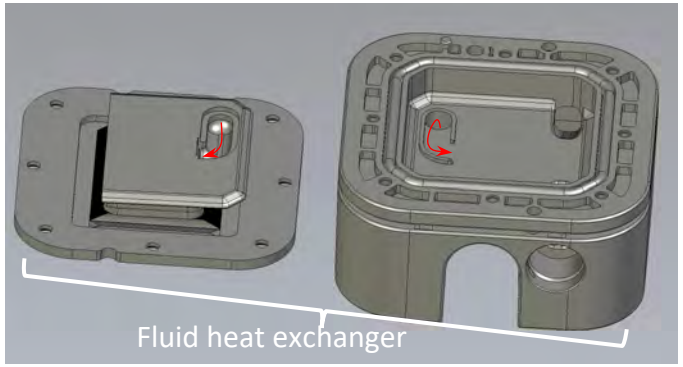


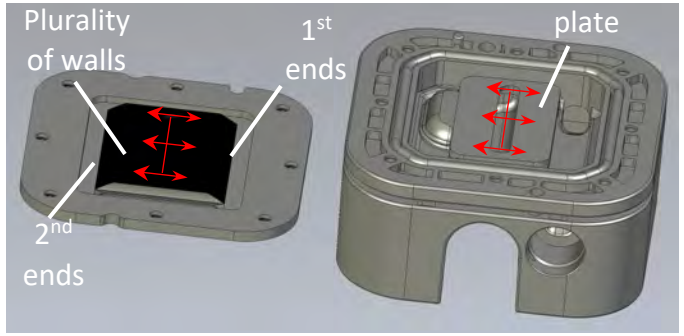


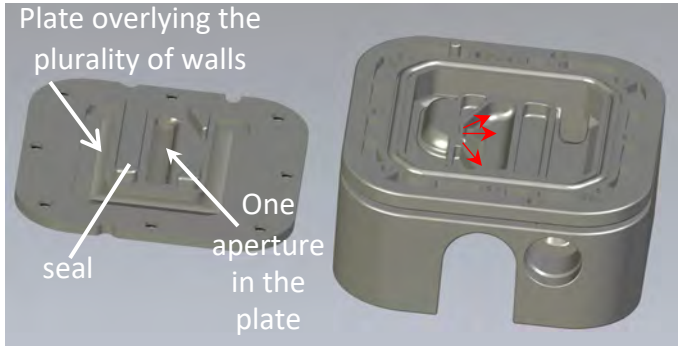
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[c]. a fluid inlet passage configured to deliver a heat-exchange fluid through one aperture in the plate to each microchannel at a position between the corresponding first end and the corresponding second end of the respective microchannel;	The red arrows superimposed on images to the right depict the fluid inlet passage by showing segments of the continuous passage from the inlet port through various components and ultimately to the opening into the microchannels. Although not a portion of the inlet passage, flow through the microchannels is indicated by the outwardly extending red arrows in the lower left image. The upper left image, the lower right image and the lower left image show a portion of the fluid inlet passage that delivers coolant through one aperture in the plate to each microchannel (indicated by red line extending longitudinally of the aperture in the plate). The fluid inlet passage delivers the heat-exchange fluid to each microchannel at a position between the first and second end of each respective microchannel (indicated by outwardly extending arrows in the lower left image).



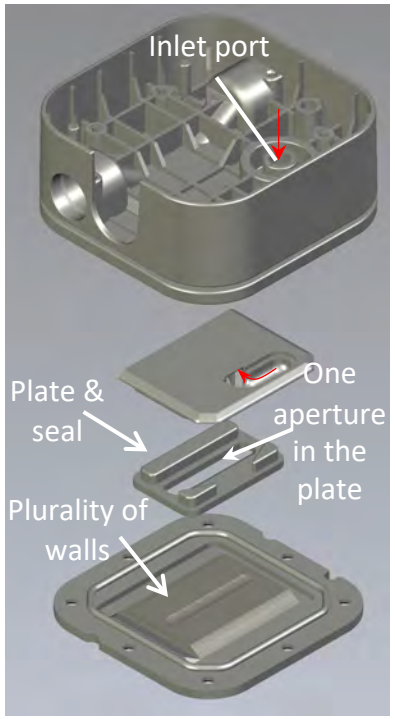


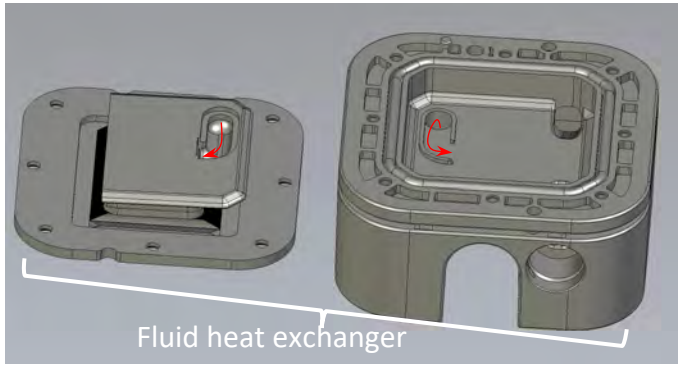


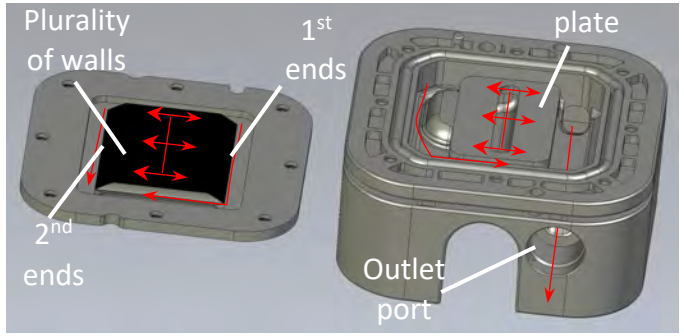


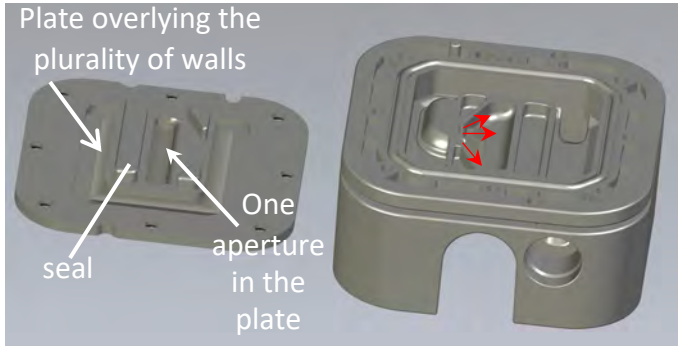
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Tamriel Device
13[d]. a fluid outlet passage configured to receive the heat-exchange fluid from the first end and the second end of each microchannel,	The image at lower left shows a fluid outlet passage (indicated by red arrows) configured to receive the heat exchange fluid from the first end and the second end of each microchannel. As the red arrows on the previously slide indicate, the coolant enters the microchannels and bifurcates into two sub flows: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage (indicated by the red arrows at lower left) receives the coolant from both ends of each microchannel and delivers the coolant to the outlet port (lower left).



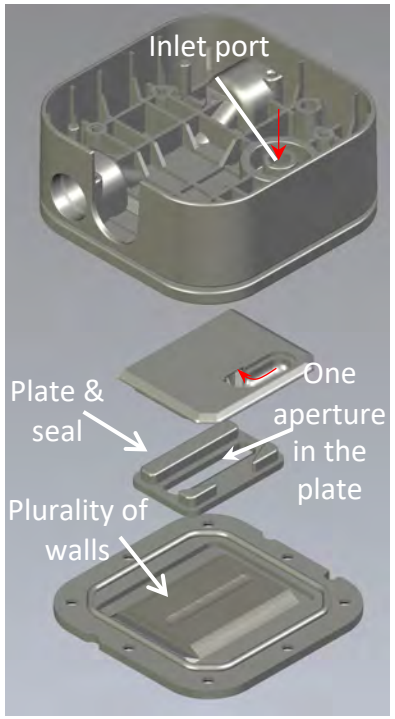


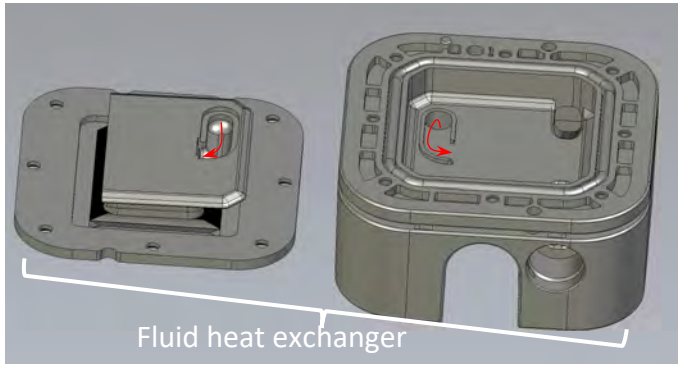


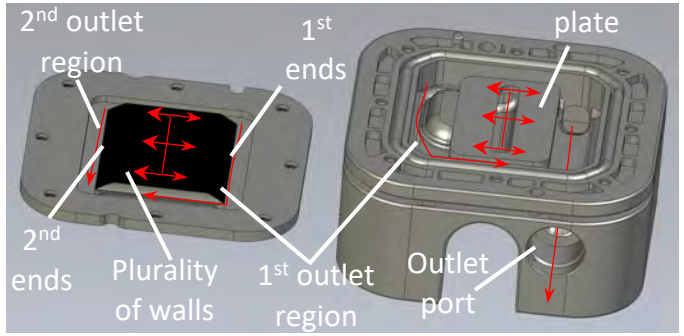


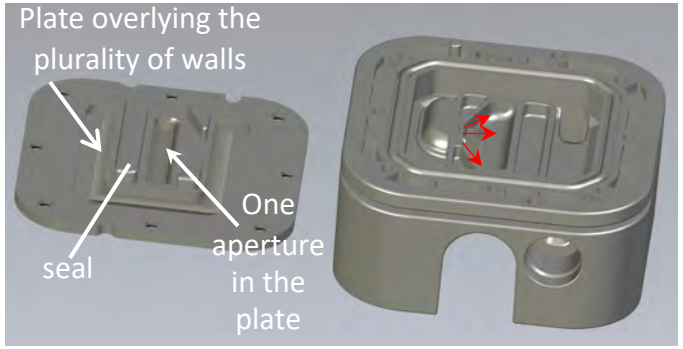
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[d][1]. wherein the fluid outlet passage has a first outlet region positioned adjacent the microchannel first ends and a second outlet region positioned adjacent the microchannel second ends,	The lower left image shows that the fluid outlet passage has a first outlet region positioned with no intervening solid structure between it and the microchannel first ends and a second outlet region positioned with no intervening solid structure between it and the microchannel second ends.



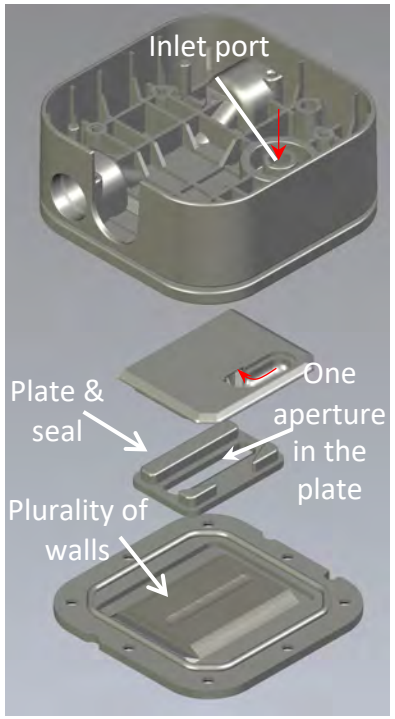


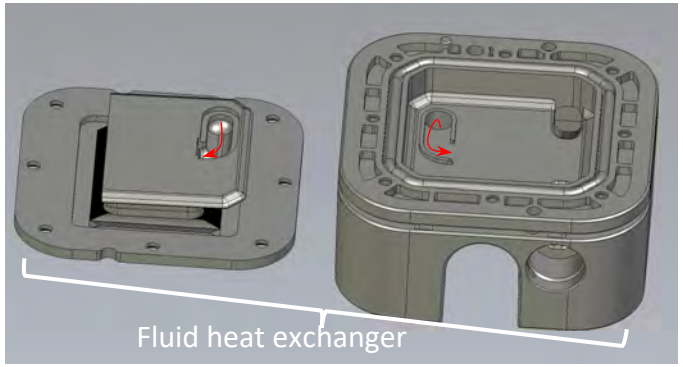


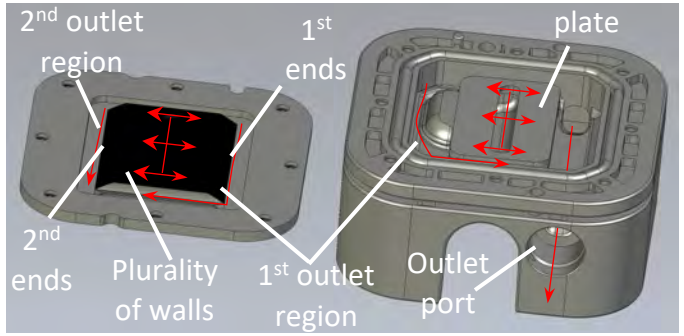


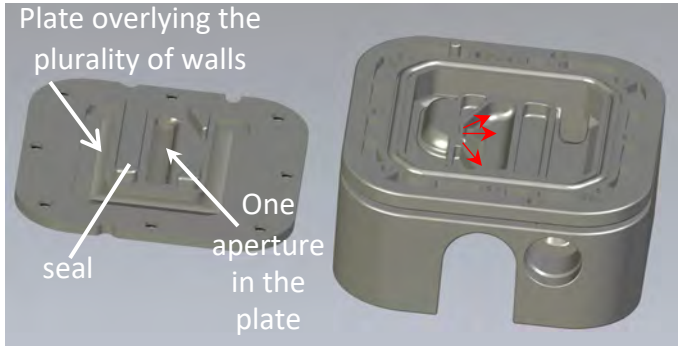
’266 Patent - **Claim 13**

’266 Patent Claim	Comparison to Tamriel Device
13[d][2]. wherein the seal separates the fluid inlet passage from the fluid outlet passage;	The images at lower left and lower right show that the seal separates the inlet passage from the outlet passage. Because of the seal’s position and fluid-tight engagement with the housing insert, coolant must flow through the microchannels as indicated by the red arrows (upper right image) before reaching the outlet passage, rather than short circuiting and bypassing the microchannels by flowing directly from the inlet passage to the outlet passage.



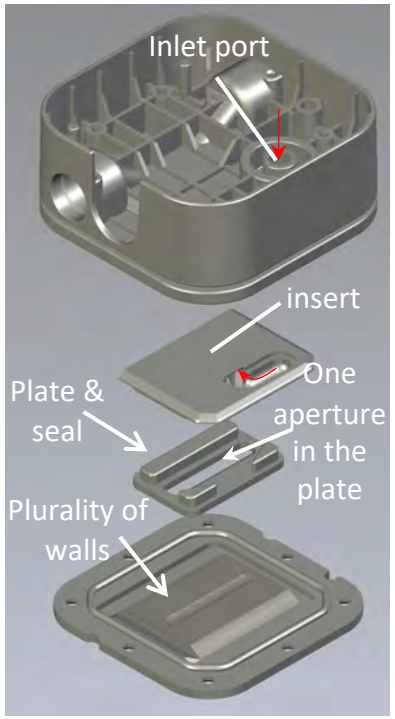


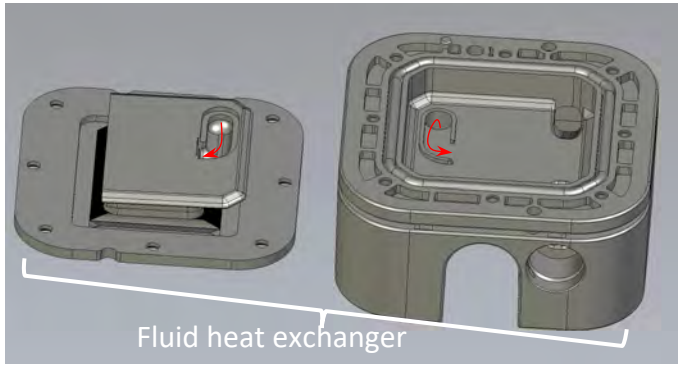


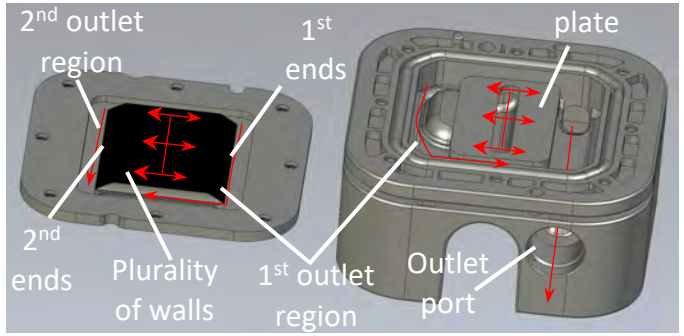


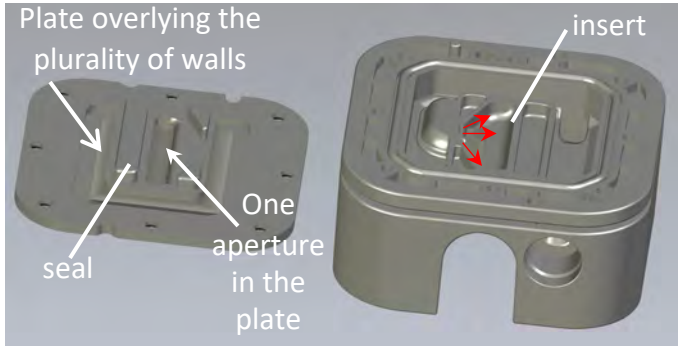
’266 Patent - Claim 13

’266 Patent Claim	Comparison to Tamriel Device
13[d][3]. wherein a flow of the heat-exchange fluid through the one aperture in the plate bifurcates into two sub flows within each microchannel,	As the red arrows in the lower left image indicate, the coolant enters each of the selected ”plurality of microchannels” and bifurcates into two sub flows within each microchannel: one sub flow is directed toward the first end of the microchannel and the other sub flow is directed to the second end of the microchannel. The outlet passage receives the coolant from both ends of each microchannel.
13[d][4]. wherein the first outlet region receives one of the two sub flows adjacent the microchannel first ends and the second outlet region receives the other of the two sub flows adjacent the microchannel second ends,	As indicated in the lower left image, the first outlet region receives one of the two sub flows (outwardly facing red arrows at lower left) with no intervening solid structure between it and the microchannel first ends. Similarly, as shown in the lower left image, the second outlet region receives the other of the two sub flows (outwardly facing red arrows at upper right) with no intervening solid structure between it and the microchannel second ends.
13[d][5]. wherein the two sub flows recombine in the outlet passage.	As indicated in the lower left image, the two sub flows recombine in the outlet passage, e.g., near the outlet port, similar to a disclosed embodiment in the ’266 patent. See, e.g., ’266 patent, FIG. 2 (showing that the sub flows recombine near the outlet port 128).



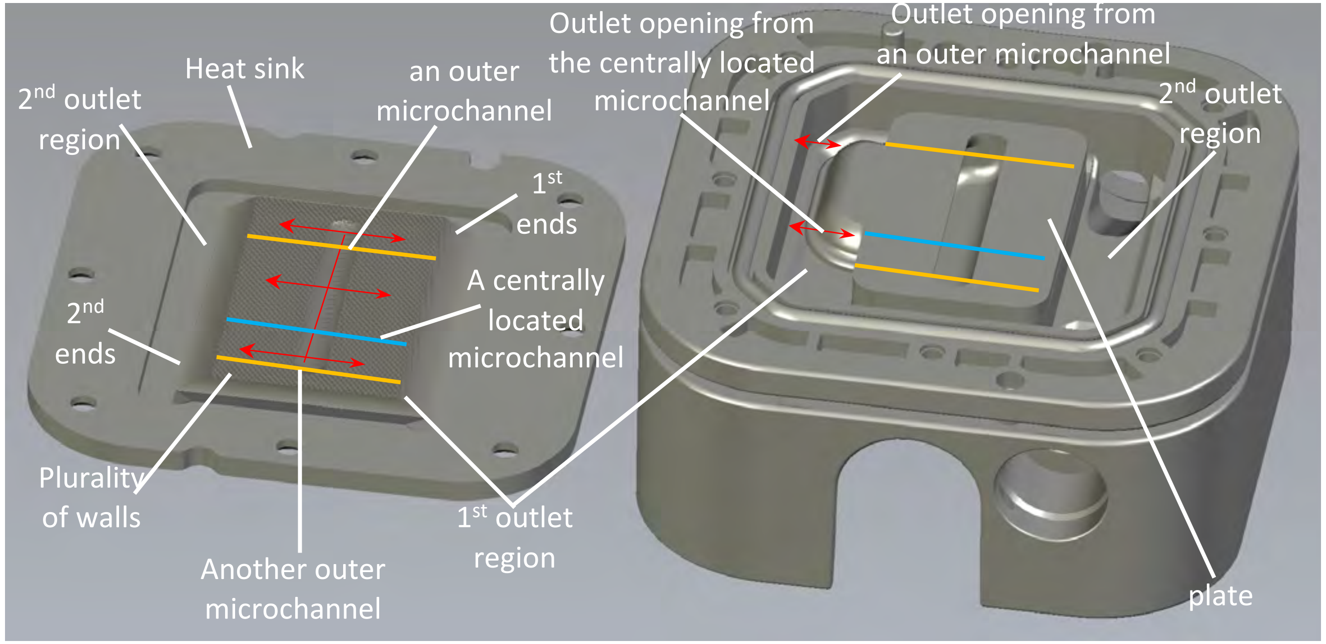






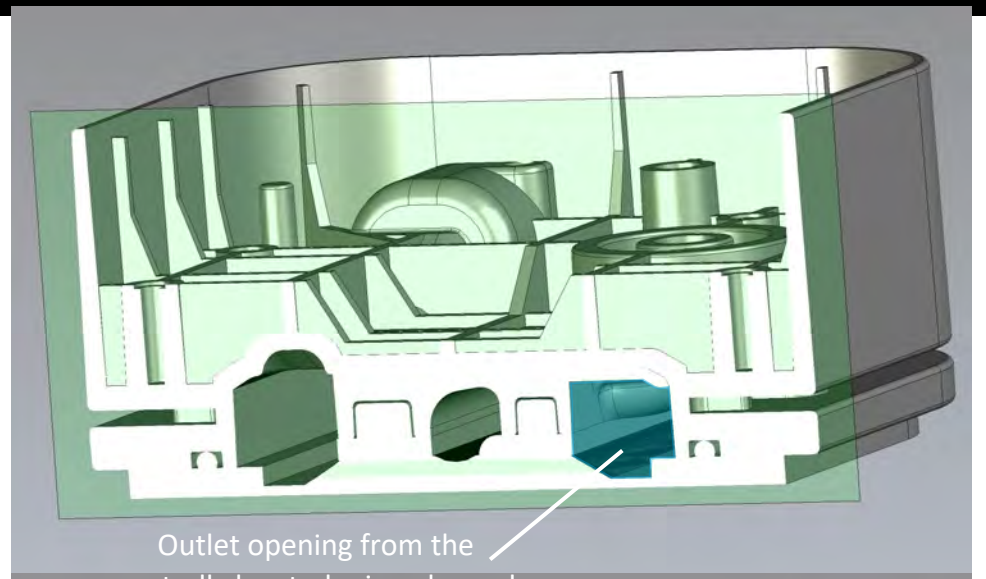
’266 Patent - Claim 15

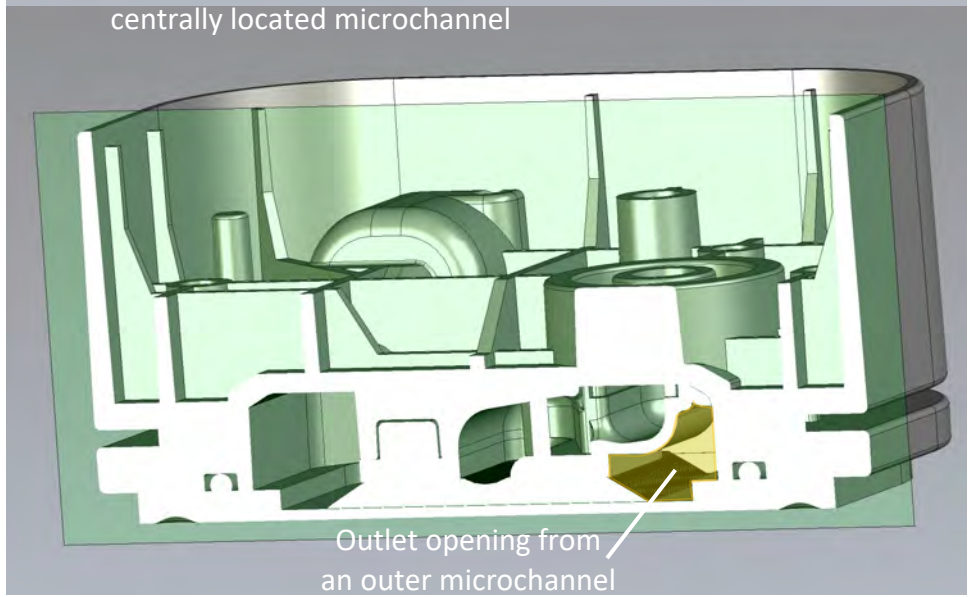
’266 Patent Claim	Comparison to Tamriel Device
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	The left image shows that the Tamriel Device includes at least two opposed outer microchannels (orange lines) and a centrally located microchannel (blue line) positioned between the opposed outer microchannels. (This is true regardless of whether the microchannels arise from the "split flow fins" or some other selected group of fins.) As well, each microchannel has an outlet opening to the first outlet region. As indicated by the red arrows superimposed on the right image, the outlet opening from the identified centrally located microchannel is larger than the outlet opening from at least one of the identified outer microchannels. [continued on next page]

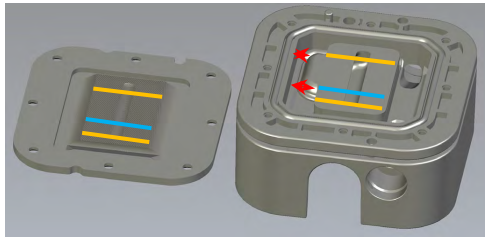


’266 Patent - Claim 15

’266 Patent Claim	Comparison to Tamriel Device
15. The fluid heat exchanger according to claim 13, wherein the plurality of microchannels comprises at least two opposed outer microchannels and a centrally located microchannel positioned between the opposed outer microchannels, wherein the first outlet region comprises an outlet opening from each microchannel, wherein the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.	The top left image and the bottom left image are cross-sectional views of the Tamriel Device taken parallel the identified centrally located microchannel and the “at least one of the outer microchannels” identified on the previous page. The blue shaded area in the top left image shows the outlet opening from the centrally located microchannel. The orange shaded area in the bottom left image shows the outlet opening from the identified “at least one of the outer microchannels.” At right, a comparison of the areas of the outlet openings is shown. In the middle right image, the areas of the outlet openings are superimposed on each other. The image at lower right shows the area of the outlet opening from the centrally located microchannel that remains when the area of the opening from the outer microchannel is subtracted or removed. In other words, the lower right image shows that the outlet opening from the centrally located microchannel is larger than the outlet opening from at least one of the outer microchannels.







Comparison of outlet openings from the centrally located microchannel and at least one outer microchannel

The area by which the outlet opening from the centrally located microchannel is larger than the outlet opening from the identified outer microchannel